

Auto Diagnostic Computer Equipment  
**【USER'S MANUAL】**

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## FCAR F3 Series Product Operation Manual Instruction

- ● Before using FCAR F1, F3 series product, please read this manual carefully.
- ● This manual is based on the current product features and configurations. If adding new features and configuration, this manual will subsequently be amended, the new specification can be download at FCAR website (<http://www.szfcar.com/>).

Please carefully read the "Note" " remark " of the user manual to ensure that the user can use properly and safely.

## FCAR F3 Series Main Unit Maintenance and Use Attentions □

- Do not allow unauthorized demolition.
- Avoid strong impact.
- Avoid closing to the magnetic field.
- Do not put this machine a long time in a hot environment.
- Do not put this machine a long time at a low temperature environment.
- Do not click on the screen violently or by using weapon.
- Do not use water and chemical solvents to clean the machine, using a soft clean cloth and neutral detergent to clean.

## Automobile Inspection Notes

- Shall operate by adhering to auto repair industry safety rules. Special attention to the impact or damage caused by the environmental factors such as the surrounding pH, poison gas, high pressure heavy.
- Vehicle battery fluid contains sulfuric acid, while sulfuric acid is corrosive to the skin, in operation should avoid skin having direct contact with battery fluid. Particularly, be careful not to splash into the eyes. Avoid nearing fire.
- Engine exhaust emissions contains a variety of toxic compounds, should avoid inhalation .When operating, the vehicle should be parked in a well-ventilated place.
- When the engine is running the temperature is high, should avoid contact with high temperature components such as water tank and exhaust pipes.
- Before starting the engine, should hold the handbrake, gear lever is placed in neutral (manual transmission) or [P] gear position (automatic transmission), so as to avoid the vehicle rushing out and cause accident when starting the engine.
- Before repairing the vehicles, hold parking brake well, shift transmission gear into the neutral position or P gear, and lower the driver's seat side glass doors and windows.

- If the engine can start, first warm up to normal temperature (water temperature at about 80 °C), and close the auxiliary electrical appliances (such as air conditioning, lighting, sound, etc.).
- Find the diagnostic socket of this vehicle, and check, confirm the diagnostic socket circuit intact, connecting the main unit for diagnosis. Otherwise, do not test, to avoid damage to the main unit, if necessary, using a multimeter to measure the voltage of diagnostic socket.

## Instrument Use Notes

- When use FCAR F3-D products for testing, you must handle with care and be away from heat and electromagnetic field, to avoid interference with the main unit.
- When electrical components energized, you can not disconnect the circuit to prevent the self-inductance, mutual inductance attacking sensors and automotive ECU.
- When electrical equipment works, avoid putting non-magnetic objects close to the vehicle control unit, otherwise the vehicle control unit may be damaged.
- When dismantling vehicle control unit or electrical components, must be carried out 1 minute after turning off the ignition switch.

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## **1. Product Introduction**

### **1.1 FCAR F3-D Introduction**

FCAR-F3-D is the newest version of multi-functional intelligentized automotive scanner which is specialized to design for the diagnosis of diesel engine electronic control systems by FCar Company on the basis of National High Technology Research and Development Program of China (863 Program). Product is suitable for large and small maintenance business, training institutions, automobile manufacturers, repair stations, diesel Engine manufacturers, mining machinery, petrochemical energy enterprises and so on.

The auto scanner adopts the advanced modular design technology which is capable of diagnosing and learning a variety of domestic, European, United States, Japanese and South Korean gasoline, diesel power system quickly and easily and is the most comprehensive testing system and testing models automotive fault diagnostic computer of world.

It provides multi-language platform to meet different customers' demands. Products with integrated structural design, to achieve 12V, 24V power supply automatical changeover. Single-track working mode and superlarge touch screen operation, exquisite look and so on, these special designs make you feel cozy and freely. It adopts smooth features drive technology and has good extensibility, which not only satisfies for the modern vehicle ECU communication bus testing, but also the vehicles appearing in the future.

### **1.2 FCAR F3-D Product Features**

It follows the international standard design and adopts the advanced modularized design technology

With opening structure design and independent operating system, it makes system software and diagnostic software upgrade more convenient in the future.

Its working power supply is from Vehicle storage battery which can meet the voltage change between 9~27V. Internal power supply is designed by separating power supply which can avoid products to be damaged when vehicle voltage is abnormal.

Good extensibility, its communication interface adopts flexible drive circuit which not only can perform current auto bus request, but also the auto bus request in the future. Built-in high and low speed CAN-BUS, to satisfy the CAN-BUS electronic control system vehicles, Just only one diagnostic interface can test all of vehicles with CAN-BUS. Support All OBD-II protocols.

Built-in high speed Printer to be convenient to record the data and save Trouble code etc..

Screen follows International standard LED true-color industry touch-screen. It is good guaranteed under strong sunshine and poor conditions

Multi-language operation edition which can meet different countries and areas demand and use.



## **1.3 Care and Maintenance**

### **1.3.1 Storage Environment**

- 1) Store FCAR on a flat and dry place with suitable temperature.
- 2) Never put FCAR in direct sunlight or near to the heating source.
- 3) Never put FCAR in the magnetic field.
- 4) Avoid smoke, water and oil to enter FCAR.
- 5) Avoid shock, dust, moisture and extremely high temperature.
- 6) Power off the machine and make sure the power cable is removed, then clean the outside surface and touch screen with soft cloth that is dipped with a little water if main unit is dirty.

### **1.3.2 Main Unit Protection**

- 1) Handle with care. Avoid hitting.
- 2) Be careful to plug and unplug the main cable and diagnostic connector. Tighten the screw before operation to avoid unexpected disconnection and/or damage to the port.
- 3) Put back the machine and cables, connectors etc. accessories to box to avoid loss.

### **1.3.3 Touch Screen Care**

- 1) Dust may be accumulated on the LCD screen due to electrostatic. Suggest to buy the special LCD screen wiper to clean the screen gently.
- 2) Don't wipe the screen with bare finger to avoid fingerprint attached. Never use chemicals to clear the screen.
- 3) Never put FCAR to close the electromagnetic wave products to avoid any effect on the screen.
- 4) Never put FCAR in direct sunlight or ultraviolet radiation for long time to extend the life of screen.

### **1.3.4 Precaution on Operation**

- 1) Forbidden to switch main unit frequently and Cut off the power suddenly, power supply instability and abnormal power supply etc..
- 2) Unplug the power after operation to save the product life.
- 3) Never insert or pull out SD card when machine is turned on to avoid SD card damage or SD card data loss.

- 4) Don't expose product under the chemical volatility environment to avoid any corrosion of hardware.
- 5) Never clear product with chemical solubility reagents like banana water, engine cleaning agents, gasoline etc..
- 6) Don't put anything on the screen to avoid any damage.
- 7) Periodically startup FCAR main unit if it is not operated for long time to avoid moisture.

### 1.3.5 SD Card Care

- 1) Don't power on/ power off FCAR frequently
- 2) Take antistatic actions to avoid SD card contacting with static.
- 3) Operate SD card until finish the data transfer when upgrade or connection.
- 4) Don't plug/unplug SD card with electricity or strong force
- 5) When encrypt the contents of the card you should remember password, or as much as possible not to encrypt data.
- 6) When on-line use high quality data transmission equipment. Transmission distance shouldn't be too long.
- 7) When FCAR main unit works, avoiding plug and unplug SD card from the main unit arbitrarily.
- 8) Avoid to use cleaning fluid to clean.
- 9) When inserting SD card, the insertion direction must be correct (insert error can lead to SD card or SD card slot damage).
- 10) Do not twist and bend SD card.

## 1.4 Help

FCAR F3-D product, provided with supporting service, is easy and simple to maintain. From purchase, use, upgrade, maintenance and so on, the marketing network that spread over various regions will provide you with the most convenient and efficient service.

FCAR company provides users with online help. If you want to know the company's latest product, or automotive diagnostic information, you can log on via the Internet, "FCAR" Website: <http://www.szfcar.com/> or company Forum: <http://www.szfcar.com/bbs/> You will receive a comprehensive and detailed help service.

## 2. Product Configuration

### 2.1 FCAR Hardware Introduction

#### 2.1.1 FCAR Main Unit Frontside Configuration

The left Figure2.1.1 is the frontside configuration diagram of FCAR F1 and F3 series.



Figure 2.1.1 Main unit configuration

No.	Name
1	F3 series main unit cover
2	Paper Out Button
3	Power Button (Startup button)
4	F1 series main unit cover
5	FCAR F3 touch LCD
6	Printer Cover and Printer Paper Exit
7	Power Button
8	LED Screen
9	Communication indicator light

#### 2.1.2 FCAR Main Unit Side Configuration

The left figure 2.1.2 is the top configuration of F1 and F3 series main unit.

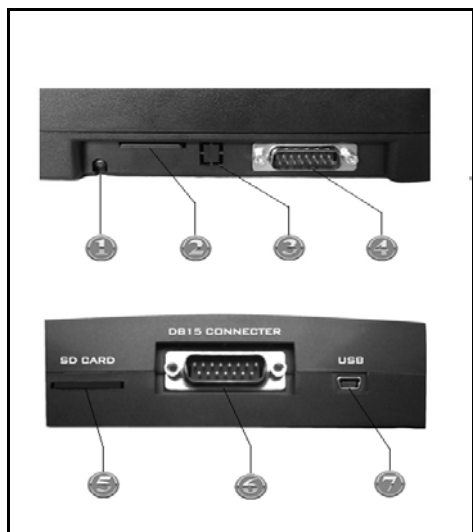
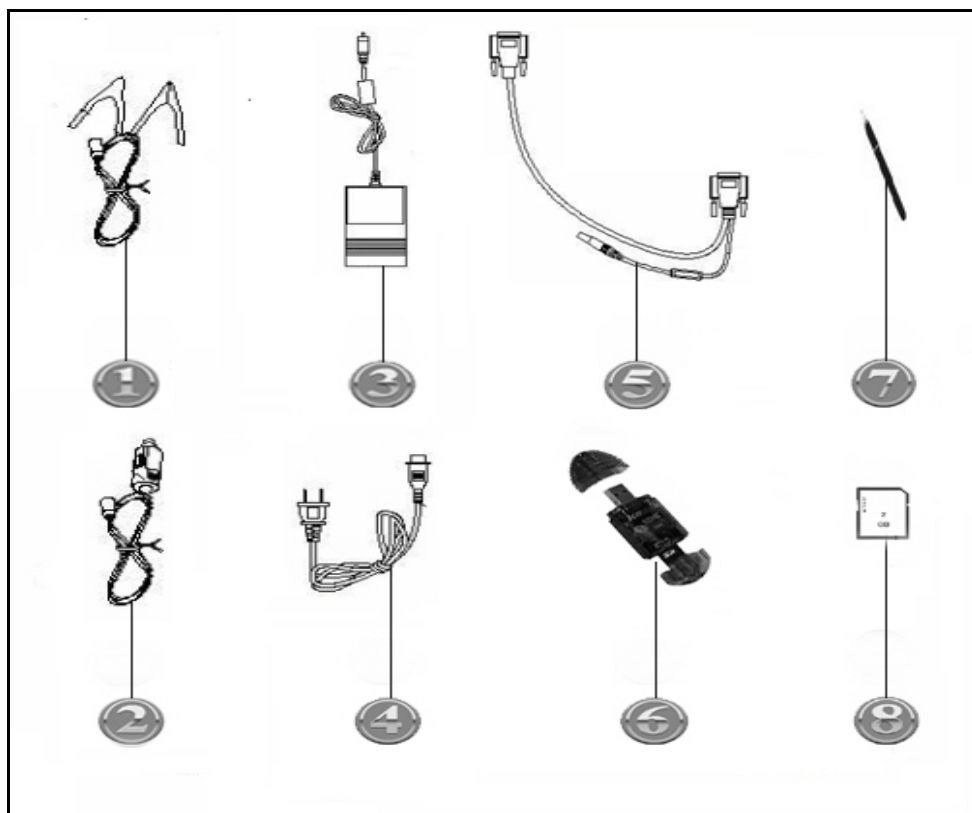


Figure2.1.2 Main unit configuration

NO.	Name
1	Touch stylus slot
2	SD Card slot
3	Extensible power port
4	Diagnostic Port
5	SD Card slot
6	Diagnostic port
7	Printer port

### 2.1.3 Common Accessories Introduction














Picture 2.13 common accessories


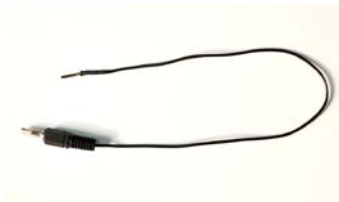


NO.	Name	No.	Name
1	Double clamp power cord	5	Main testing line
2	Cigarette lighter power cord	6	SD card card reader
3	220V power adapter	7	Touch pen
4	Adapter power cord	8	High speed SD card

### 2.1.4 Diagnostic Connector Introduction


**Note:** Standard Accessories are configured according to software, actual configuration base on packing list.







No.	Photos	Name	Discription
1		[OBD II -16]	Suitable for the vehicles with CAN BUS and without CAN BUS system
2		[ISUZU-20]	Suitable for the vehicles with ISUZU Engine and ISUZU company assembled 20PIN diagnostic socket
3		[BENZ Ssang Yong-14]	Connect SSANGYONG and BENZ vehicles assembled 14PIN diagnostic socket
4		[IVECO-38]	Suitable for the vehicles with IVECO Engine and IVECO company assembled 38PIN diagnostic socket
5		[VOLVO-8]	Suitable for the vehicles with VOLVO-Engine and VOLVO company assembled 8PIN diagnostic socket

No.	Photos	Name	Discription
6		[DENSO-12]	Suitable for the vehicles with Japan DENSO engine ECU and DENSO company assembled 12PIN diagnostic socket
7		[WIT-3]	Suitable for the vehicles with VTV engine ECU and VTV company assembled 3PIN diagnostic socket
8		[IVECO- 30]	Suitable for the vehicles with VECO engine ECU and VECO company assembled 30PIN diagnostic socket
9		[CUMMINS-9]	Suitable for the vehicles with CUMMINS engine ECU and CUMMINS company assembled 9PIN diagnostic socket
10		[CUMMINS-6]	Suitable for the vehicles with CUMMINS engine ECU and CUMMINS company assembled 6PIN diagnostic socket
11		[OBD-16]	Suitable for the vehicles assembled with round 16PIN engine and vehicles assembled 16PIN diagnostic socket


No.	Photos	Name	Discription
12		[Universe jumper holders]	Suitable for the vehicles in irregular diagnostic communication or engine jumper wire test
13		[pin-shape Jumper]	Suitable for the vehicles in irregular diagnostic communication or engine jumper wire test
14		pin-shape Jumper	Suitable for the vehicles in irregular diagnostic communication or engine jumper wire test
15		pin-shape Jumper set	Suitable for the vehicles in irregular diagnostic communication or engine jumper wire test

### 2.1.5 Other Accessories

NO.	Photos	Name	Description
1		Product User's Manual	To introduce product operation

NO.	Photos	Name	Description
2		Maintenance Data (Chinese)	Auto relevant technical information
3		Certificate of approval	
4		Envelope	put the warranty card
5		Product packlist	To check the packaged goods
6		Software list	To check the current software list
7		Product package box	Package all one set product



NO.	Photos	Name	Description
8		Product box	
9		CD	Product user's manual and photos storage
10		Main Unit Cover	Protect the Main Unit
11		Training Log	To record the repair record for the technician
12		Printing paper	Print for the detecting result and data reference report
13		fuse	Use to avoid the Main Unit abnormal from the excessive Current of Main Unit



Picture2.1.6

Item	Unit/ method	parameter
Print method	Thermal dot-matrix Printing	
Number of rows	(dot-matrix / row)	384
Resolution	(dot-matrix / mm)	8
Paper width	(mm)	58+0-1
Print width	(mm)	48
Print speed	(mm / s)	62.5
Paper feed method	Direct in	Bend out
Detect method	Thermal-Printing head temperature\ Heat inductor	----

Table 2.1.7



Figure 2.1.8A

## 2.1.6 Main Unit Parameter Introduction

Hardware parts	parameter	type
CPU	200MHZ	SAMSUNG ARM 2410A
RAM	64M	SMD
Flash memory	SD card	Plug-in type
Power	12V/3A	DC direct voltage
Diagnose interface	---	DB15
SD card interface	---	International
Display	8-inch LED	TFT LCD Color Touch Screen
Resolution Ratio	600*800	dotmatrix
External dimension	290.7×207.3×45	mm
Net weight	1365	gram

## 2.1.7 Printer Parameter Introduction

FCAR F3 main unit built-in mini thermal printer, adopting the way of direct in and bent out, reduced the risk of printing stagnation. Table 2.1.7 is the printer parameters.

## 2.1.8 Printing Paper Installation

Pull up the bracket behind the main unit, take the main unit bracket out from the mounting hole, as shown in Figure 2.1.8A.



Figure 2.1.8B

2: Pull the paste open in the back of the main unit cover, pull up the leather case in the main unit bracket slightly, remove the main unit from the back-end of leather case, as shown in Figure 2.1.8B.



Figure 2.1.8C

3: Put the main unit flat on a table or other flat surface, pull out the printer cover in the bottom of the main unit, take out the printer cover, as shown in Figure 2.1.8C.



Figure 2.1.8D

4: Take the printing paper navigation bar down from the printer as shown in Figure 2.1.8D.

**Note: When taking out the printing paper navigation bar, first take down the left side( navigation bar left side has no gear) and then the right side, the wrong order can lead to abnormal wear on the navigation bar gear or navigation bar damage .**



Figure 2.1.8E

5: Unpack the printing paper provided by FCAR company and pulled out printing paper from the roll of 5cm or so, put the printing paper into the installation slot, hold the printing paper beginning end, as shown in Figure 2.1.8E.

**Note: the exit of printing paper must be installed downward, if installed the wrong direction, can cause the printer can not print.**



Figure 2.1.8F

6: Install the printing paper navigation bar on the navigation bar bracket, as shown in Figure 2.1.8F.

**Note:** when installing the print paper navigation bar first install the right side of navigation bar (the right side with gear), then place printing paper in the most middle (if printing paper is not in the most middle of the navigation bar, can cause the printer jams or the contents printed out drift ), and then install the left side.



Figure 2.1.8G

7: Passing the printing paper out from the paper exit in the back of printer paper cover as shown in Figure 2.1.8G, according to the reverse order of dismantling printer cover to install the printer cover, and to ensure that the printer cover board bayonet and the main unit cover locked.

8: Tear down the extra printing paper, as shown in figure 2.1.8H (normally tearing the printing paper off rightward).



Figure 2.1.8H

9: Main unit power on, select Print on the main unit menu, and check the results printed out to ensure that the printing contents normal, no stagnation, abnormal noise phenomenon.

**Note:** Under the working condition of the main unit, press button **【LF】** on the left side of the printer, the printing paper will automatically deliver paper, to ensure the integrity of printing results.

10: Install the main unit protective case

11: Install the main unit stand.

## 3. Operation Guidance

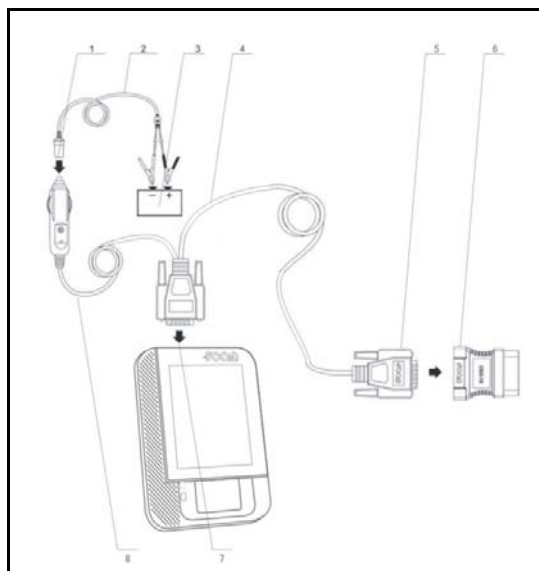


Figure 3.1.1

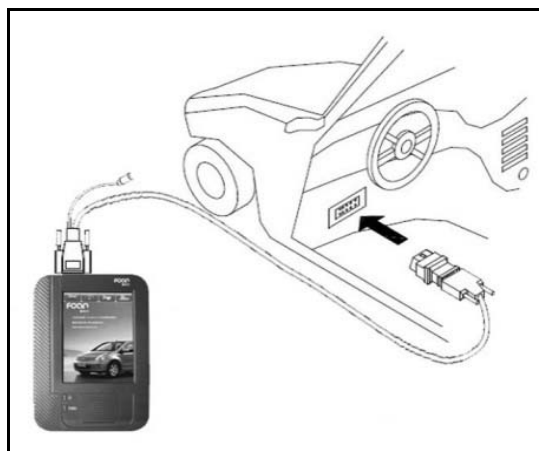


Figure 3.1.2

### 3.1 Power and Testing Cable Connection

#### 3.1.1 Main Unit Power Supply

FCAR F3-D main unit power supply has four kind of ways, as shown in Figure 3.1.1

- ① Through the power adapter supply
- ② Vehicle diagnostic socket power supply
- ③ Vehicle cigarette lighter power supply
- ④ Vehicle battery power supply

#### 3.1.2 Cable Connection Method

Option of Power :

If the diagnostic socket not with power supply, can choose ① ③ ④ in 3.1.1 one of the three power connection methods to provide power for the main unit.

If the diagnostic socket with power, you do not need to connect another power cord.

Testing line connection as shown in Figure 3.1.2.

The prerequisites for vehicle:

- 1 confirm the diagnostic socket location, shape, and whether need for external power supply.
- 2 select the appropriate connector according to vehicle model and shape of diagnostic socket.
- 3 Connect one end of the main testing line to the other end of main unit diagnostic connector.
- 4 plug diagnostic connector that connected with the main testing line into the vehicle diagnostic socket
- 5 confirm that main unit with power and start up.

**Note:** vehicle diagnostic interface in Figure 3.1.2 is a standard OBD-II interface. In connection needs both ends of the main testing line to connect OBD-II connector and FCAR man unit respectively. Plug OBD-II diagnostic connector into the diagnostic socket to complete the connection.



Figure 3.1.3



Figure 3.2.1

### 3.1.3 Start Up

Through any one of the four power supply power ways described in 3.1.1 supply power, press the button [POWER] in the bottom left of the main unit screen. The main unit will be getting started, and then enter into the running state. As shown in Figure 3.1.3.

### 3.1.4 Shut Down

When you're done with the equipment, oprate the touch screen back to desktop, press the [POWER] key in the button left of the main unit screen to shut down. As shown in Figure 3.1.3.

Notes:

When startup or shutdown, the button operation time is generally 1 ~ 2ms, long press the On and Off button can cause key failure.

## 3.2 Starting Up Interface Menu Introduction

### 3.2.1 Starting Up Interface

Connect the power supply, press the power switch key, the screen first appears FCAR product identification, then at the top of the starting up progress bar appears 【if you want to adjust the touch screen please click screen directly】, as shown in 3.2.1.

Notes:

**If you need adjustment of touch screen, please at this time click on anywhere of the screen with touch pen to enter into adjustment mode. During the adjustment of touch screen you must use touch pen to adjust.**

**If don't need for touch screen adjustment, the system will enter into the desktop in 2ms.**



Figure 3.2.2



Figure 3.2.3A

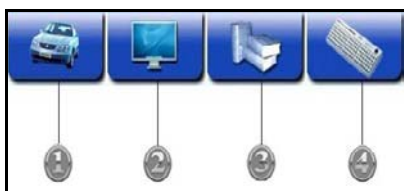


Figure 3.2.3B

### 3.2.2 Starting Up Screen Adjustment

In Figure 3.2.1, if use touch pen to click on anywhere of screen, the main unit menu wil enter into the touch screen adjusting mode.

The main unit screen prompts **【Please click cross cursor (the more precise alignment, the better for your adjustment)】**, according to the prompt, click on the cross of the screen in turn with a touch pen counter-clock wisely from top left corner of the screen. (Cross cursor in the four corners of LCD screen respectively). Figure 3.2.2 is the display of menu after entering adjusting mode.

After adjustment, and the main unit showing correct information, then log on to the desktop menu.

### 3.2.3 Desktop Menu Description

When the main unit starts normally, the main unit will enter the desktop menu, as shown in Figure 3.2.3A. The top of desktop is the menu bar. Desktop background displays product models, update Web site, the service network.

Desktop top from left to right is

- 1: **【Diagnosis】**
- 2: **【System Setting】**
- 3: **【Professional Dictionary】**
- 4: **【Repair help system & Screen Keyboard】**

**Note: in the bottom right position of the menu shows \*\*\*\*date \*\* month \*\* year representing the last update time of the software program.**

No.	1	Trouble diagnostic program
	2	System setting
	3	English-Chinese Dictionary
	4	08 version: Soft keyboard09 version: Auto Repair & Maintenance Database





Figure 3.3



Figure 3.4



Figure 3.4.1

### 3.3 Use of Diagnostic Program

FCAR F3-D test program is divided into two major systems: diesel series and Construction Machinery, as shown in Figure 3.3.

**Diesel series menu** contains the current diesel series software configured by F3-D main unit software, including diesel series of Chinese series, American series, European series, and Asian series OBDII / EOBD.

**Construction Machinery menu** contains the diesel series software of current F3-D main unit software configuration, including construction machinery of Chinese series, American series, European series, and Asian series.

### 3.4 System Settings

Select the menu **【System settings】** with the touch pen at the top of desktop, then appears the sub-menu of the system setting menu. Sub-menu as shown in left figure 3.4, were:

**【System information】** **【Touch screen adjustment】** **【User information】** **【System theme】** **【Language setting】** **【System activation】**

#### 3.4.1 System Information

Select **【System Information】** and enter, the main menu pop-up dialog box for the hardware information, operating system version, software version, database version, memory information of product in current use. Operating the button **【OK】** on the left side of menu to return to previous menu.

Operate **【diagnose】** button on the right side of the menu, then the device will diagnose automatically. As shown in Figure 3.4.1.



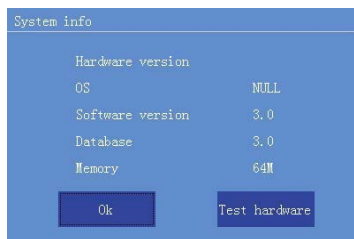


Figure 3.4.2



Figure: 3.4.3

### 3.4.2 System Diagnosis

This feature is used for checking Fcar F3 series whether with hardware problems by operating the **【Diagnosis】** button.

If the main unit hardware failure, then the main unit menu will prompt the occurrence of fault code in testing, According to fault codes, you can consult Fcar Company After-sales Service Department to handle it. As shown in Figure 3.4.2.

### 3.4.3 Touch Screen Adjustment

This feature is used in the operation of main unit functions, when using touch pen to select the main menu, the menu the main unit entered is offset with the actual selection of the menu screen the screen deviation needs adjustment. Screen can be adjusted at the time of starting up. Detailed operation method see 3.2.2 above. Or adjust it on the menu.

Menu Screen adjustment: In the System Settings menu, select **【Touch screen adjustment】** to enter adjustment program, the main unit screen prompts **【Please click cross cursor (the more accurate the better for your adjustment)】**. According to the prompts click the cross in turn on the screen with the touch pen. (Cross cursor in the four corners of the LCD screen respectively). Figure 3.4.3 is the display of menu after entering the adjustment mode.

After adjustment and the main unit shows adjustment information, log on to the desktop menu.

**Note:** when can not adjust through the touch screen adjustment menu, you can adjust it at the time of starting up.

Figure 3.4.4

Figure 3.4.5

### 3.4.4 User Information

After user purchase equipment, fill in information by themselves: Company name (can fill in company name or individual name), address (to help customers who need repair easy to find the detailed address), zip code, telephone, fax, support, website, email. Information about the user. Information shown in Figure 3.4.4. After finished input press **【OK】** button to save, press **【Cancel】** button to cancel the save.

**Note:** when input must first select the right input location. **【capital】** in keyboard area of the bottom of the screen is for changecase. **【ZhCH】** is for conversion between Chinese and English. **【Letters】** is used for conversion between the letters and numbers. **【Back】** is for user to delete the inputted error character or letter.

### 3.4.5 System Theme

Used for setting programs menu background . This theme comprise a total of five settings for selection : the classical theme, blue theme, green theme yellow theme, Grey theme, as shown in Figure 3.4.5. The Setting of the theme is based on working environment to avoid the visual gap between different environments. When setting select the appropriate theme in the system settings dialog, you can click on the small box behind the theme to select, then click on **【Confirm】** button to save. Press **【Cancel】** button to cancel this operation.

**Note:** If change the theme on the menu, you need to restart the main unit to make the new theme taken effect.



Figure 3.4.6

### 3.4.6 Language Setting

The menu is used for the setting of the main unit language type. This machine offers four options: simplified Chinese, English, Russian, Traditional Chinese as shown in Figure 3.4.6. When setting select the appropriate language in the Language dialog, you can select by clicking on the small box behind the theme, then click **【Confirm】** button to save. Press **【Cancel】** button to cancel this operation. **Note: If change language type on the menu, you need to restart the main unit to have the new language pattern taken effect.**



Figure 3.4.7

### 3.4.7 System Activation

Each FCAR main unit when leaving factory has not been permanently activated, it only can operate 50times use (as shown in Figure 3.4.7, only after the user purchased, the user can activate the device through FCAR website or Email to FCAR service people. (Also some customer request to active by FCAR when shipping ).

System active detail method pls ref. 6.1



Figure 3.5

### 3.5 Professional Dictionary

When you can not understand the professional vocabulary encountered in the routine maintenance and learning, you can enhance personal skills by understanding and learning them through professional dictionaries. For example: after inputting "ETC" in the input field click **【Search】** button to search the word, the system according to the corresponding data displays the words about ETC in the left column, select the appropriate search word and click on the word, the word in Chinese can be automatically translated and display in the right column shown in Figure 3.5. If you're done, press the **【exit】** key to logout. **Note: The dictionary supports full-writing and abbreviation.**



Figure 3.6

### 3.6 Maintenance Help System & Screen Keyboard (Chinese)

Maintenance help system & screen keyboard display differently in different versions, specific version is subject to real object.

#### 3.6.1 Maintenance Help System

The maintenance help system covers match setting operating function and device operating methods of common models, operational function menu refer to Figure 3.5 professional dictionary.

#### 3.6.2 Screen Keyboard

Different menus of FCAR main unit contain different input methods, As shown in Figure 3.6. three kinds of keyboard: letters input, uppercase and lowercase letters input and English and Chinese input and digital input, digital input.

## 4. Vehicle Diagnosis



Figure 4.2A

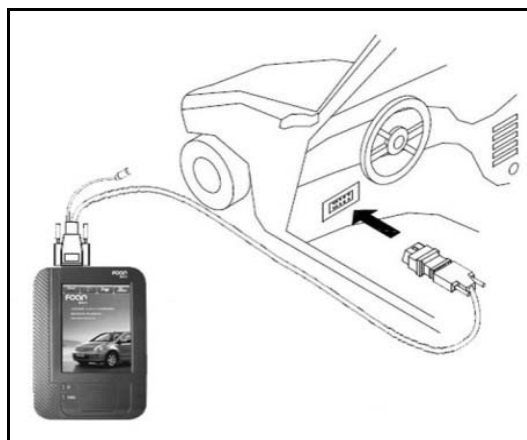


Figure 4.2B

### 4.1 The Technical Prerequisites for Diagnosis

#### 4.1.1 Equipment Requirements

Equipped with FCAR main unit and a variety of test connectors. According to the type of vehicle diagnostic socket, select the corresponding test connector.

#### 4.1.2 Vehicle Requirements

- 1, the ignition switch is ON stalls.
- 2, vehicle battery voltage should be between the 11-14V or 24-27V (subject to the power supply of vehicles).
- 3, the accelerator pedal is turned off, namely the idle point.
- 4, ignition timing and idle speed should be in the standard range, transmission temperature and oil temperature reach to normal operating temperature(water temperature 90-110 ℃, transmission oil temperature 50-80 ℃)
- 5, diagnostic circuit is normally connected.

Different models have different diagnostic socket position, diagnostic socket position of vehicle model See 【 8.Diagnostic Socket Position Introduction of Common Model】 .

#### 4.1.3 The Requirements for Maintenance Technician

- 1) must have basic knowledge of automotive electronics.
- 2) understand the basic operations of the equipment and familiar with operating instruction
- 3) about the tested vehicle trouble phenomena can basically distinguish between mechanical

failure or malfunction of electronic control part.

4) Understand the origin, year of manufacture, model, engine model of the vehicle.

## 4.2 Connection of FCAR F3-D and Diagnostic Socket

### 4.2.1 Standard OBD-II Interface Connection

According to the diagnose interface of the to-be-detected vehicle, select suitable connector for diagnostic vehicle, if the diagnostic vehicle configured with standard OBD-II diagnose interface, you need to connect both ends of the main testing line to the main unit and OBD-II interface respectively, and lock the fixed bolts, then insert the vehicle diagnostic connector into diagnostic socket of vehicle terminal, as shown in Figure 4.2.1.

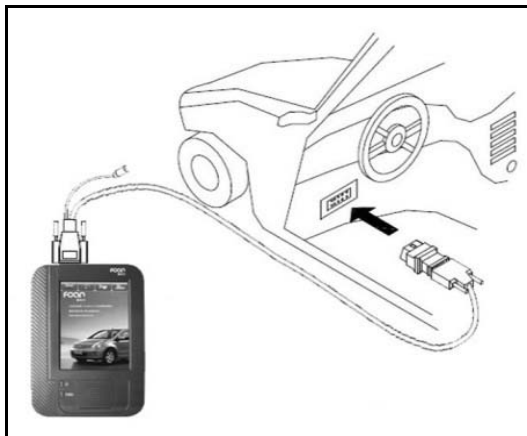


Figure 4.2.1

### 4.2.2 Non-OBD-II Interface Connection

If the currently testing interface is not the standard BOBD-II interface, first need to confirm what shape of the current vehicle diagnostic interface, and then find currently suitable interface in F3-D configured interface, and then connect. In Connection, first connect the main testing line to the main unit and the OBD-II interface respectively, then connect the appropriate interface to OBD-II.If the current vehicle interface is the DENSO-12 diagnostic socket, you can connect OBD-II female connector of DENSO-12 to OBD-II, insert the other end of the DENSO-12 into vehicle , and then you can carry out related diagnosis, as shown in Figure 4.2.2.

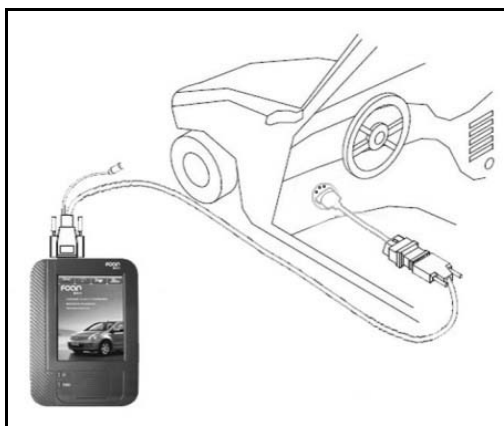


Figure 4.2.2

### 4.2.3 Connection Between Jump Box and

#### Vehicle Diagnose Interface



Figure 4.2.3A

During the Vehicle diagnosis, often encounter the the situation that vehicle diagnostic socket considered damaged, modified, or was taken wrong, which could result in the situation that using the appropriate diagnostic connector can not connect. At this time you could use the jump box to conduct jumper connection. Specific connection method is:

1) connect the jump box with the main testing line, and lock the fastening bolts, as shown in Figure 4.2.3A.

Will see 15 jumper holes in the jump box, the side of each labeled with the number. the corresponding figures of connection holes is the node relations of standard OBD-II interface. As shown in Figure 4.2.3B.



Figure 4.2.3B

2) the node relations of jumper box are:

- |                                      |                               |
|--------------------------------------|-------------------------------|
| 1#: K line;                          | 2#: K line;                   |
| 3#: K line;                          | GND: ground wire (cathode);   |
| 6#: CAN-H;                           |                               |
| 7#: RSR232+, J1708+, K line;         | 8#: K line;                   |
| 9#: K line;                          | 10#: K line;                  |
| 11#: K line;                         | 12#: K line;                  |
| 13#: K line;                         | 14#: CAN-L;                   |
| 15#: RSR232-, K line, J1708-, L line |                               |
| VCC:power line (anode);              | POWER: power indicator light. |

3) There are eight jumpers in total in the assembly box with red, black, yellow. Red jumpers usually used for connecting power supply positive, black jumper for connecting

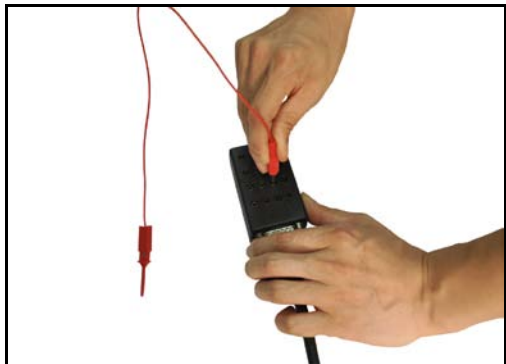


Figure 4.2.3C

power negative, yellow jumper for connecting signal lines. Jumper is classified into two kinds, namely, needle type and line card type, when in specific use according to vehicle terminal to choose the right one.

4) According to the current detecting vehicles, choose suitable jumpers and jump box to connect, connecting methods as shown in Figure 4.2.3 C.



Figure 4.2.3D

5) According to the vehicle diagnostic socket information, connect the diagnostic interface of the jumper box, as shown in figure 4.2.3D.





Figure 4.2.3.E

After finished the connection, turn the ignition switch to the ON gear, then Power indicator on the jumper box lights. Press the F3-D main unit switch, F3-D main unit will work normally, as shown in Figure 4.2.3E, choose the appropriate system for diagnosis.

**Note: If lack of knowledge on electric vehicles, or can not confirm electrical power, do not operate those jumpers. The wrong jumper operation can lead to vehicle electrical failure or FCAR F3-D main unit and wire fault.**

The confirmation of related information about automobile diagnostic socket and tools:

**1: Digital high impedance multimeter (can not use the pointer multimeter).**

**2: When the ignition switch turn to the ON gear position, there is supply voltage of vehicle on diagnostic socket. The voltage difference between the voltage on diagnostic socket and battery terminal can not exceed 2.5V.**

**3: If the signal line used in diagnosis is single wire communication (K line), the signal line voltage is lower than the battery voltage, (If the vehicle power supply voltage is 12V, then the signal line voltage is 11V, plus or minus 0.25V, if the power supply voltage is 24V ,the signal line voltage is 21V plus or minus 0.25V).**

**4: If the communication of the double signal line adopts CAN communication, the two diagnostic lines measure grounding line voltage with a multimeter under the condition that ignition switch on. The sum voltage of the two is 5V, average is 2.5V. The one that voltage slightly higher than 2.5 V A is CAN-H, the one that voltage slightly lower than the 2.5V is CAN-L.**

## 5. F3-D Program Usage

### 5.1 Training Mode

#### Introduction



Figure 5.1A



Figure 5.1B

The software of FCAR F3-D is configured with the training program for the convenience of the user to understand the automobile diagnosis, allowing users to quickly familiar with vehicle diagnostic procedures.

The user can fully understand the related steps of automotive diagnosis under the condition of disconnection after buying the automobile.

1) First of all, power to the main unit, press the main unit switch to start, and then select automotive diagnosis.

2) In the pop-up lower menu, choose **【diesel vehicles】** into the lower menu, after entering the menu you can see the (training mode), as shown in Figure 5.1A.

**Note: Training Mode in the second place of the first line of the menu.**

3) Select the **【training mode】** into the lower level menu. The display of **【V5.0】** in the menu displays the version of the current training mode. As shown in Figure 5.1B.



Figure 5.1C



Figure 5.1.1A



Figure 5.1.1B

4) Select the version information into the lower menu.

Menu shows the current training system available, namely: Bosch systems (BOSCH), electrical installation system (DENSO), Delphi system (DELPHI), as shown in Figure 5.1C.

According to individual needs, choose the system need to know. If you need to understand that system you can select the corresponding system into this system to learn.

### 5.1.1 Usage of the Bosch System

Select Bosch system to enter, where static diagnostic data and dynamic diagnostic data can be seen. As shown in Figure 5.1.1A.

Note: static diagnostic data is the operable function of this electronic control system in the stationary state (ignition switch is ON stalls, the engine does not start).

Select static diagnostic data into next menu.

The menu covers the related functions of internal ECU under static diagnostic data. As shown in Figure 5.1.1B.

Select readout fault codes / freeze frame to next menu.

Selecting Clear fault codes can operate the clearance of the current fault codes stored within ECU.

Selecting troubleshooting guides are available for analyzing and clearing the current fault code stored within ECU.

Selecting System identification can view the related parameters within the current ECU including the engine model, ECU software version number, hardware version number, factory number ... .. and other related parameters.



Figure 5.1.1C



Figure 5.1.2A



Figure 5.1.2B

Exit the menu as Figure 5.1.1B, and selecting the dynamic diagnostic data can check the dynamic diagnostic data within the current ECU (engine at idle or working under non-idle data).What can be checked as shown in Figure 5.1.1C.

Read version information that is the configuration information of current ECU software.

Reading data stream which is the changes of data between sensors, actuators, controllers that currently satisfies the basic work of engine.

Action test is the working condition checking function of the electronic control system actuator. Operating the corresponding actuator can judge working condition of actuator.

Functional test is the test of engine in some other load state under working condition.

### 5.1.2 Usage of the Denso System

Select Denso system to enter, in the Denso system you can see the engine model matched with Denso. As shown in Figure 5.1.2A.

Select mode P11C DENSO system to enter the next menu.

According to the different design of software for each ECU manufacturers, the content of diagnostic program are differentiated to some extent. After access to Denso system you can see the following on the menu:

Version Information: The current ECU related technical parameters.

Reading Current Fault Code: The fault codes that stored in current ECU.

Reading historical fault code: for the display of fault codes that haven't been cleared before.

Clear fault codes: clearance of current and



Figure 5.1.3A



Figure 5.1.3B

historical fault codes.

Read the data stream: real-time display of all the electronic control system data.

Action Test: used to check the work condition of the actuator.

Nozzle data: used for read out and write in of the injector QR code

### 5.1.3 Usage of the Delphi System

Select Delphi system to enter, in the system you can be see the engine model matched with Delphi system . As shown in Figure 5.1.3A.

According to the different design of software for each ECU manufacturers, the content of diagnostic procedures differs. After into the Delphi system you will see the following on the menu as shown in Figure 5.1.3B.

Fault Codes: The current fault codes stored in ECU.

Clear fault codes: clearance of current and historical fault codes.

Read sensor data: real-time display of electronic control system data.

Read system data: display of variety of switch data within the ECU .

Action Test: used to check the actuator

Nozzle data: used for read-out and write-in of the injector QR code.

Write VIN code: for the write-in of vehicle identification code

Leak test: used to check the fuel system working conditions.

PC version: The current ECU related technical parameters.

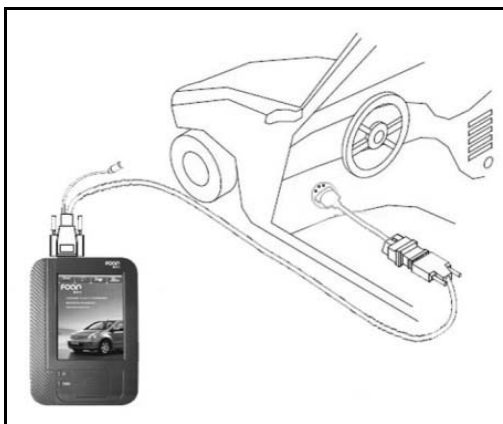


Figure 5.2A

## 5.2 Steps of Vehicle Diagnosis

- 1, Find the location of vehicle diagnostic socket.
- 2, Select the connector according to the vehicle diagnostic socket model.
- 3, Connect the main unit to the wire or connector of the to-be-detected vehicle.
- 4, Connect the testing connector to the vehicle diagnostic socket as shown in Figure 5.2A.

Note: If the power supply of diagnostic socket of diagnostic vehicle insufficient or its power supply pin damaged . You can obtain power supply by any of the following ways:

- 1) through the cigarette lighter cord: insert one end of cigarette lighter cord to automobile cigarette lighter hole, the other end of the FCAR main testing line connect to power plug.
- 2) through the double-clamp power cord: connect power clamp of double-clamp power cord to the battery positive and negative, insert the other end into the FCAR main testing line power plug.
- 3) through the power adapter: Insert one end of the power cable into 250V AC power socket, connect switch power supply plug to the power socket of FCAR main testing line.
- 5, open the ignition switch to the ON gear or start the engine.
- 6, operating the On-Off key (POWER)on FCAR F3-D main unit.

7 Select the area of current diagnostic vehicle in diagnostic program.

For example: The current vehicle in maintenance is Chengdu Kobelco, which belongs to Chengdu Kobelco Construction Machinery . According to the division of system, then need to select construction machinery systems, where to find Chengdu Kobelco.

Figure 5.2.B is the Regional division .



Figure 5.2.B



Figure 5.2.C



Figure 5.2.1



Figure 5.2.2

8, Take The Chengdu Kobelco Construction Machinery as a Case for diagnosis. If the current testing model is Chengdu Kobelco, belonging to Chengdu Kobelco Construction Machinery, therefore needs to choose the construction machinery. After entering into the construction machinery menu, find Chengdu Kobelco in the menu, as shown in Figure 5.2.C. The construction machinery manufacturers also appear in the menu. The bottom of the menu has【Page Up】 , 【Page Down】 , 【Exit】 .

9、 to find it in the fourth column of the second line on menu according to signs and characters of menu.

Note: As per page displaying auto manufacturers is limited, so need to find the software of the vehicle that to be detected through the Page Up , Page Down and the scroll bar on the right side.

### 5.2.1 Selection of Diagnostic Program Version

Click 【Chengdu KOBELCO】icon into the next menu. The menu prompts【Please select version】 , as shown in Figure 4.2.1. Because the current version of Chengdu Kobelco is one version, it currently shows one version V5.7. If there are multiple versions of the software, choose the higher version.

### 5.2.2 Selection of Engine Model

Click the icon 【V5.7】 into the next level menu, and the menu will show all of Chengdu Kobelco's series engine models as shown in Figure 5.2.2.

In testing you need to know the testing engine series, such as: which model of Chengdu Kobelco engine it belongs to, and this information can be obtained from the vehicle nameplate and the VIN code.

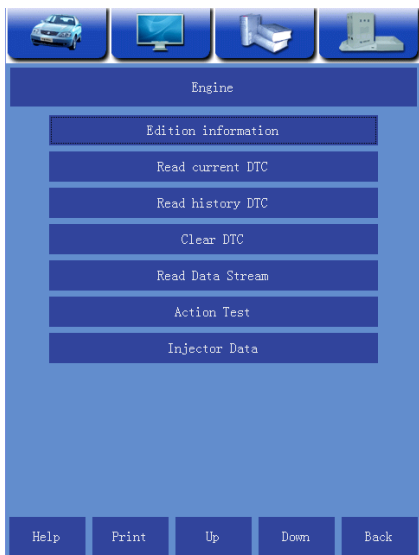


Figure 5.2.3

Understand the engine series that is going to be tested, select the appropriate model on the menu.

If the testing model is Hino J05E, then select **【Hino J05E】** to enter the next level menu interface.

### 5.2.3 Selection of System

Select Chengdu Kobelco engine model and series consistent with the actual vehicle, and then select the system that needs diagnosis based on the current vehicle configuration. After entering the system, the related functions currently supported by ECU will be achieved. As shown in Figure 5.2.3

**NOTE: If the tested system different from the selected software or signal communication line connection error, will result in the testing system can not communicate with FCAR auto fault computer diagnostic equipment.**



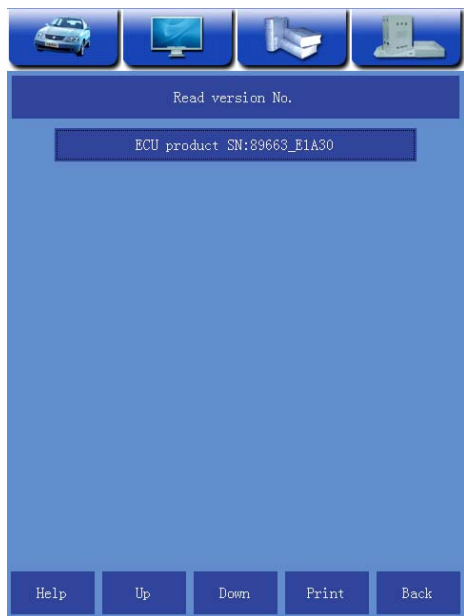


Figure 5.3.1

## 5.3 Selection of Diagnostic Function

### 5.3.1 Readout the Information of Computer Version

In the menu as shown in Figure 4.2.3, selecting the **【Version information】** can read the product number of ECU. As shown in Figure 5.3.1.

Note: This information comes from the vehicle computer. The contents that the auto fault diagnostic computer displays is the ECU version information. The information content is the unique ID prescribed by ECU manufacturers.

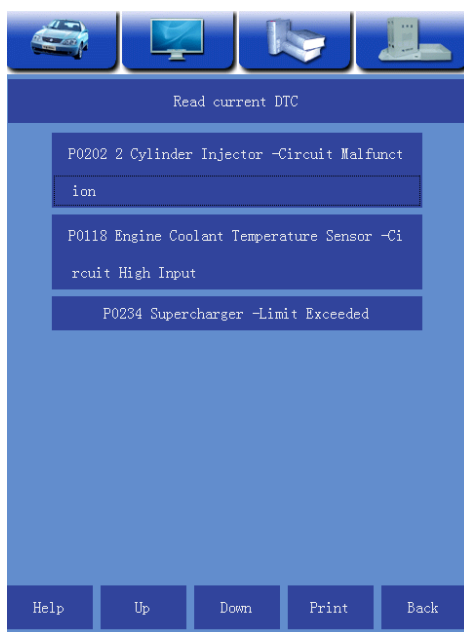


Figure 5.3.2

### 5.3.2 Readout the Current Fault Code

In the menu of Figure 4.2.3, select **【read current fault code】** for reading the current fault code recorded by vehicle ECU self-diagnosis, and make explanation about fault content. As shown in Figure 5.3.2

Note: Operating the five function keys below the menu can conduct functional operation.

NOTE: Obtaining the fault code digital information from random access memory RAM of auto computer control unit (ECU) through auto fault diagnostic computer.

---

#### Fault Code Analysis:

About the fault code, people who has some knowledge of vehicle maintenance will tell you, fault code refers to when the vehicle electronic control system such as engine or gearbox break down, the system control unit ECU or self-diagnostic module of ABS module detects system component fault to meet specific program conditions, and have the fault information in form of digital code stored in a special area within the module such as RAM, ROM, or keeping current memory KAM. When the vehicle maintenance technician diagnose vehicle breakdowns, these fault codes can be obtained from memory through the external auto fault diagnostic computer.

By interpreting and analyzing the fault information corresponding to these codes, the maintenance technicians can quickly find faults, to avoid the diagnostic work going astray.

#### Fault Code Setting Conditions:

The whole control system is composed of many subsystems (sensors, actuator elements, power supply, controller) circuit composed. Therefore, the content of trouble code contains not only the sensor or actuator elements failures, but rather showing that the the signal of the system is abnormal , which may be caused by any part of the (components, connectors, circuit, or computer), so fault code only provide the general direction of further testing for maintenance personnel, but does not tell us exactly what and where occurred failure. Therefore, fault codes mainly play the role of the maintenance guidelines.

When engine is working normally,Trouble self-diagnosis system will mornitor the components of Electronic control system and ECU own working, the LEV between the singal to ECU from the sensors and the control signal from ECU both are in the normal range. Once the input or output sinal of ECU is not in the normal range,self-diagnosis system will point out the trouble about the signal,meanwhile the light on the dashboard will be immediately lit and store relevant trouble code into ECU's memory. When starting the diagnostic operation, you can get out the trouble code through the auto fault diagnostic instrument, which brings great convenience for the clearance of fault codes.However, if used incorrectly or rely on the trouble code too much, blindly repair or replace some components without any analysis. it can't solve the problem and even it will result in new touble and more problem.

#### Steps of Fault Code Analysis:

- A: Readout and record all fault codes
- B: Clear all fault codes
- C: confirm that fault code has been cleared
- D: simulate the conditions that fault arised and make the road test
- E: reread and record the fault code at this time
- F: distinguish between sporadic fault code (soft fault codes or irrelevant fault codes or historical fault codes)

and continuous fault code (the current fault code or related fault code, or hard fault code)

G: distinguish between the main fault and minor fault code that are relevant to fault symptoms

H: distinguish between various fault codes or the main fault codes among related fault codes (which may lead to the cause of other trouble codes)

I: based on the above analysis, further detects accurately the sensor, the actuator elements or control computer and relevant circuit state represented by fault codes so as to ascertain the exact location of trouble spots.

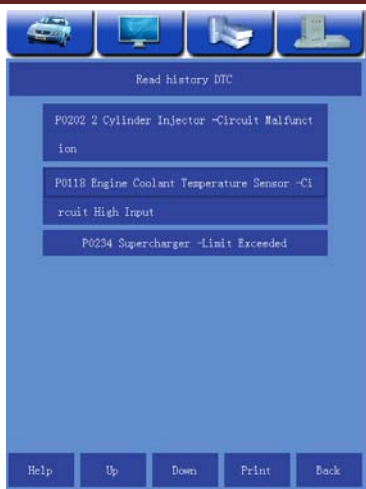


Figure 5.3.3



Figure 5.3.4



Figure 5.3.5A

### 5.3.3 Readout the Historical Fault Code

Select **【Read historical fault code】** in the menu of Figure 5.2.3, used to read the historical fault code recorded by vehicle ECU self-diagnosis, and make explanation about the fault content. As shown in Figure 5.3.3

Note: Operating the five function keys below the menu can conduct function operation.

### 5.3.4 Clear Fault Code

select **【Clear fault codes】** in the menu of Figure 5.2.3 for the clearance of fault codes recorded by the auto electronic control system self-diagnosis. After clearing the fault, using the auto fault diagnostic computer to clear the fault information from the computer's random access memory ROM. As shown in Figure 5.3.4.

**Note: During fault diagnosis, first record or print out the fault code, and then clear, for the reference of maintenance. Fault code that can not be cleared is the existing actual fault, should find vehicle fault and repair first, then re-clear the fault code.**

### 5.3.5 Readout Dynamic Data Stream

In the menu of Figure 5.2.3, select **【Read dynamic data stream】**, and you can detect vehicle control system controller, sensors, actuators and the data that satisfies the engine running. As shown in Figure 5.3.5A. In the progress bar of the operation menu right side you can view the next item, or next page of data. Also can choose the data needed to view to display priority. For example: if want the preheat relay parameters displayed in the first page to appear in the second page, click on the preheat relay text and it will display on the first page.



Figure 5.3.6A



Figure 5.3.6B

### 5.3.6 Data Stream Save

In the menu of Figure 5.3.5, select Save key below the menu, the system will save the current data stream, as shown in Figure 5.3.6A.

Select **【OK】** on the menu button to save.

According to personal work habits, operate keyboard to input the file name in the pop-up dialog box to save. As shown in Figure 5.3.6B.

Note: File name can be composed of numbers, letters, Chinese characters. Preferably named after the current testing model name and model year for reference.

### 5.3.7 Data Stream Files Delete

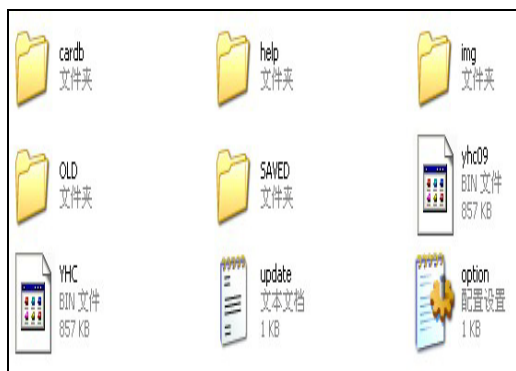


Figure 5.3.7

The data stream that user self studied is automatically saved in the **【SAVED】** folder of SD card, as shown in Figure 5.3.7. Format the SD card before upgrading, please save this folder to physical hard disk of the PC (personal computer) to avoid loss of study data stream. After completing the upgrade, then lead this folder to the SD card into the normal recovery study data stream. If do not need to reserve data stream, can format SD card directly.

### 5.3.8 Comparison of Data Stream

Data comparison function allows to study the data parameters automatically when the vehicle runs normally, save and compare with the corresponding data of other vehicles whether abnormal, helping users to have scientific manage and accurate judge about various operational parameters of various vehicle models so as to improve the efficiency of maintenance quickly and effectively.

Under different conditions, there are some changes in engine data. To ensure the logic of changes, you can make comparison between the saved data and present data to find the fault position quickly and visually. Operate the【comparison】 button below Actions menu, the menu displays the file name need to compare, if saved once before, then shows a comparable document,. as shown in Figure 5.3.6A .If the data saved for many times, multiple files can be displayed for comparison.

Note: If not choose the comparison files in the pop-up dialog box, the operation is invalid. After Selecting comparison file, the file name will become gray, and this means selection success.

Select documents that needs comparing, press 【OK】 button, the menu will show the current data and the data saved before, analyze them after comparing the two data .

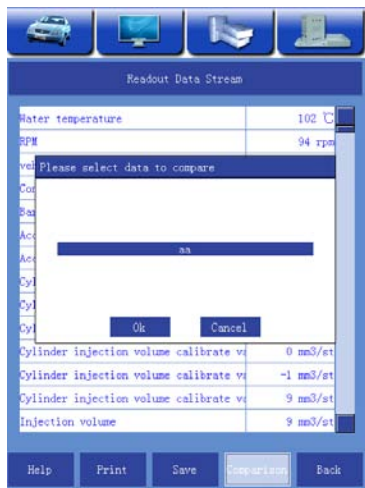


Figure 5.3.8A

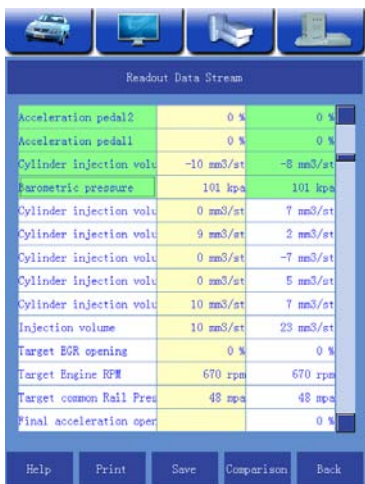


Figure 5.3.8B

### 5.3.9 Data Stream Description

Through establishing the communication between automobile fault diagnostic computer and automobile computer, get shared data out from RAM of the vehicle computer ECU to analyze vehicle trouble, so the data stream testing function is an important function of auto fault diagnostic computer. Data stream is divided into static data (KOEO) and dynamic data (KOER).

All vehicles that adopting ECU fault self-diagnosis system can use computer tester to readout the the data stream that output by various vehicle electronic control unit ECU through diagnostic socket and reflecting the electronic control unit controls system working conditions. Maintenance personnel can judge whether the electronic control devices work properly by making numerical analysis of various parameters of data stream, providing the basis for finding cause of the malfunction.

Parameters in data stream has two forms, the numerical parameter and status parameter. The numerical parameter is the parameter that has certain units and a certain change range, which usually reflects the operating voltage, pressure, temperature, time, speed, etc. of each part in the work of the electronic control unit; state parameter is those who have only two state, such as on or off, closed or disconnected, high or low, yes or no, etc., it usually signify the working condition of the components of electronic control devices such as switches and solenoid valve.

In conducting numerical analysis, you must first distinguish between the various parameters are input signal transmitted to ECU from the sensor of electronic control device or the output command sent to the electronic control unit actuator by ECU. Input signal parameters can be state parameters, so can be numeric parameters. Most of the output command parameters are state parameters, a small part is numerical parameters. Data stream parameters can be classified according to various systems of vehicle and engine. Parameters of parameters of different types or different system have different analysis methods. During electronic control unit failure diagnosis parameters of several different types or different systems are needed to go through comprehensive contrast analysis. Different brands and different models of vehicles, the name and content of electronic control device data stream parameters are not exactly the same.

The various parameters of currently common Automotive electronic control unit data stream are classified according to different systems and types, and explain its meaning, form of parameters and the unit of numerical parameters and change range. As ECU of different models determined the content of their own data parameters, therefore, when detects certain vehicle model, only part of all of the following parameters will show up on the detector.

#### (1) General Parameters:

The so-called general parameters, are those parameters who will affect several different electronic control

device of vehicle and engine simultaneously, such as engine speed, vehicle speed, work of open loop and closed-loop control system, engine load and the electronic control unit ECU overall output instruction status etc.. With engine speed, engine starting speed, programmable read code, speed, run time. Here are the most commonly used general parameters.

#### 1) The Engine Speed

When reading the electronic control device data stream, the engine speed displayed on the detector is calculated by electronically controlled fuel injection system ECU (ECU), or vehicle power system ECU (PCM) according to the engine ignition signal or the pulse signal of crankshaft position sensor, which reflects the actual speed of the engine. Units of engine speed generally adopts  $r/min$ , the change range varies from 0 to the maximum engine speed. The parameter itself has no analysis value, generally used as a reference for the analysis of other parameters.

#### 2) Engine Starting Speed

The parameter is the engine speed driven by the starter when starting the engine, the unit is  $r/min$ , showing value range  $0r/min \sim 800r/min$ . This parameter is the basis of engine ECU to control start fuel injection quantity. In analysis of the engine speed you can analyze the reasons for being difficult to start or the starting performance of engine.

#### 3) Speed

Speed parameter is the vehicle speed numerical value calculated by engine or automatic transmission ECU (ECM, TCM) according to the speed sensor signal. Speed parameter display units are miles / h or km / h.

Speed parameters are the main parameters of ECU controlled speed automatic transmission and the important parameters for cruise control. Some vehicles with automatic transmission have no speed sensor, at this time the speed shown on the speed detector is 0. This parameter is generally as a reference for the analysis of other automatic transmission control parameters.

### (2) Fuel Output Parameters

Fuel output parameters represent the state of engine ECU controlling electronic fuel injection system, and the control signal sent to actuator such as injector. There are the following.

#### 1) The Fuel Injection Pulse Width

Injector pulse width is the length of time that engine ECU controls each injection of injector, is the most important indicator of whether injector is working properly. This parameter shows the fuel injection pulse width in units of ms. If the parameter displayed values large, indicates that the time of the injector every time opening fuel injection is comparatively long, the engine will get thicker mixture; if the value small, indicates that the opening time is short, the engine will get more dilute mixture. Injector pulse width has not fixed standards, it will change as the engine speed and load vary change.

#### 2) The Target Air-fuel Ratio



This parameter is not the actual engine air-fuel ratio obtained by measuring, but air-fuel ratio to be provided calculated by the engine ECU in closed loop control according to various sensor signals, ECU would control the injector injection volume according to the size of this parameter.

The value of the parameter is generally around 14.7. Below this value represents ECU to offer dense mixed gas; higher than this value represents that should provide a more dilute ECU mixture. Some models show this parameter in way of state parameters, the content of display is thick or thin.

Such parameters are: fuel short-term correction factor, fuel long-term correction factor, fuel calibration study, the fuel calibration block; out-sync pulse, power enriched, the accelerator pedal fully open, remove the overflow; deceleration dilute, DFCO; acceleration thick, starting switch.

### 3) The Accelerator Pedal Position and Idle Speed Control Parameters

Accelerator pedal position and idle speed control parameters reflect the position of the accelerator pedal and working condition of various idle speed control device. Some parameters represent the cammands sent out to the engine idle speed and throttle pedal control device by ECU. There are the following.

#### ① Accelerator Pedal Opening

This is a numeric parameter, the units of its numeric value has three kinds according to the following different models: if the unit is voltage (V), the numerical range is from 0V ~ 5V; if the unit is angle (°), the numerical range is from 0° ~ 100°; if the unit is the percentage (%), the values range is from 0 to 100%.

The numeric value of this parameter represents the engine ECU received signal values from the accelerator pedal position sensor or the opening size of the accelerator pedal calculated according to signal. If its absolute value is small, the accelerator pedal opening degree is small; if its absolute value large, then the accelerator pedal opening degree is large. In conducting numerical analysis, you should check the numerical size of parameters when the gas pedal all closed. In voltage units, when the gas pedal all closed the numeric value of parameters should be lower than 0.5V; in angle units, when the gas pedal all closed the parameter value should be 0°; as percentage for the unit, when the accelerator pedal fully closed the parameter value should be 0. Should also check the value when the accelerator pedal fully open. Under the different units when the gas pedal fully open the values are about 4.5V; more than 95° or above 95%. If abnormal, it may be the accelerator pedal position sensor fault or improper adjustment, it also may be lines or ECU internal fault.

#### (3) Idle Switch

This is a state parameter, the display content is ON or OFF. It represents idle switch signal of the throttle pedal position sensor received by ECU. When the accelerator pedal fully closed, the idle switch of the accelerator pedal position sensor is closed, then the parameter should be ON; after opening the throttle pedal, the parameters should be OFF. If abnormal, indicating the accelerator pedal position sensor is faulty, or line, ECU internal fault. Such parameters are: target idle speed, idle speed control valve position, idle stepper angle.

### (4) The Engine Water Temperature and Intake Air Temperature Parameters

### ① Engine Water Temperature

This is a numeric parameter, the unit can be selected to be °C or °F by detector. when the unit is °C, its range is -40 °C ~ 105 °C. The parameter indicates the temperature values calculated by ECU according to signals sent by water temperature sensor. The parameter values should be able to increase gradually during the cold start of the engine to warm-up. When the engine completely hot, the idle running temperature should be 85 °C ~ 105 °C. When the water temperature sensor or circuit open circuit, the parameter appears as -40 °C. If the displayed value exceeding 105 °C, it indicates the water temperature sensor or circuit short circuit.

In some models, the unit of the engine temperature parameters is V, indicating that the parameter values are directly from the temperature sensor signal voltage. The proportional relations between the voltage and water temperature differs according to the way of control circuit, usually in inverse proportion relationships. Namely when water temperature is low voltage high, when water temperature is high, voltage low. But may also be directly proportional relationship. When water temperature sensor works normally, the parameter values are in the range of 0V ~ 5V.

### ② Starting temperature

Some models of ECU will save the the water temperature sensor signals of the moment that just turn on the ignition switch until the next starting after turning off the engine. When conducting numerical analysis, the detector will show the signal of ECU data stream in the form of starting temperature; making comparisons between the parameter values and engine water temperature values to judge whether the water temperature sensor is normal. When the engine cold starting, starting temperature and the present engine water temperature values are equal. With the hot start of the engine, engine water temperature should be gradually increased, while the starting temperature remains unchanged. If the two values always maintain the same after the start, it indicates the water temperature sensor or circuit failure.

### ③ Inlet Temperature

This is a numeric parameter, its value units are °C or °F, in units of °C, the variation range is -50 °C ~ 105 °C. The parameters indicated intake air temperature values calculated by ECU according to the intake air temperature sensor signals. When conducting numerical analysis, should check whether the value and the actual intake air temperature is consistent. Before cold starting, the parameter values should be basically the same as temperature; after cold start, along with the warming up of the engine, the parameter value should increase gradually. If the parameter is -50 °C, it indicates that the intake air temperature sensor or circuit open circuit; if the parameter is displayed as 105 °C, it indicates that the intake air temperature sensor or circuit short circuit.

### (5) Air Pressure and Air Inflow Parameter (Increase Pressure)

Air pressure and air inflow parameter indicates the atmospheric pressure around the vehicle, the engine intake manifold pressure or air intake. Engine ECU must measure these parameters to determine the engine load, and accordingly calculating the fuel injector injection quantity and spark advance angle. There are four kinds of such parameters.

### ① Atmospheric Pressure

This is a numeric parameter that represents the size of the signal voltage that sent by the atmospheric pressure sensor to ECU, or the atmospheric pressure values calculated by the ECU according to the signal. The units of the parameters are different for different vehicle models, and there are 3 species :V, kPa, cmHg, the variation range is 0V ~ 5.12V, 10kPa ~ 125kPa, 0cmHg ~ 100cmHg. ECU of some models show 2 air pressure parameters, the units are V and kPa or cmHg. These two parameters represent the size of the atmospheric pressure sensor signal voltage and the atmospheric pressure value calculated by ECU according to this signal. Atmospheric pressure values is related to altitude: in where near the sea level the pressure is about 100kPa, the plateau atmospheric pressure is relatively low, at an altitude of 4000m is about 60kPa. In the numerical analysis, if the parameters are found to have great deviation from the ambient air pressure, then it indicates the atmospheric pressure sensor or ECU failure.

### ② Intake Manifold Pressure

This is a numeric parameter, representing that the signal voltage sent by intake manifold pressure sensor to ECU, or the intake manifold pressure value calculated by ECU according to the signal voltage. The unit of the parameter varies according to model, but also 3 species :V, kPa, cmHg, the variation range is 0V ~ 5.1V, 0kPa ~ 205kPa and 0cmHg ~ 150cmHg. The pressure measured by intake manifold pressure sensor is the absolute pressure of the intake manifold behind the engine gas pedal . When the engine running the pressure depends on the opening of the gas pedal and engine speed. At the same speed, the smaller the accelerator pedal opening, the lower intake the manifold pressure (that is, the greater the vacuum); in the same accelerator pedal opening, the higher the engine speed, the lower the pressure. Turbocharged engine intake manifold pressure is greater than 102kPa (atmospheric pressure) when the turbocharger works. In flameout condition, intake manifold pressure should be equal to atmospheric pressure, the parameter values should be 100kPa ~ 102kPa. In numerical analysis if the parameter value and the engine intake manifold absolute pressure does not match, it indicates the sensor is abnormal or ECU failure.

## (6), Electrical and Ignition Parameters

Electrical and ignition parameters presents automotive electrical system status, it also includes input signal sent by ignition system to ECU and control signal output by ECU to ignition system. There are mainly following kinds.

### ① Battery Voltage

This is a numeric parameter, it reflects automotive battery voltage detected by ECU, its numerical change range is 0 ~ 25, unit is v. Engine ECU control system has no sensor specialized for detecting battery voltage, ECU obtained this value through the test of its internal circuit to the power voltage that input to ECU. When the engine running the actual numerical value of this parameter usually close to the normal charge voltage, when idle it is about 13.5V ~ 14.5V. In numerical analysis, can make comparison between the numerical value of the parameter and voltage on battery terminal. If voltage too low, indicates ECU power lines failure.

This parameter is mainly used for ECU self-diagnosis. When the battery voltage is too high or too low, some functions of ECU will change. For example: If the ECU found the voltage drops below the limit, it will send commands to the engine to run at fast idle, to increase the charging capacity. This will have an effect on idle speed control, fuel control and ignition timing parameters. In most models, if the ECU found that the battery voltage is too high, it will cut off current of all solenoid valves controlled by the ECU to prevent ECU damaging due to excessive current.

#### ② 5V Reference Voltage

This is a numeric parameter, representing the value of the reference working voltage output by ECU to some sensors, which ranges from 0 to 5.1, unit is V. The reference voltage of ECU of most vehicle is around 5.0V. The voltage is the fundamental sign for measuring whether ECU works normally. If the voltage is abnormal, indicates ECU fault.

#### ③ Spark Advance Angle

This is a numeric parameter, it represents the total ignition advance angle controlled by the ECU (including the basic ignition advance angle), the variation range is  $-90^{\circ} \sim 90^{\circ}$ . In the course of engine operation, the parameter values depends on the engine operating conditions and the relevant sensor signal, usually varies between  $10^{\circ} \sim 60^{\circ}$ . In numerical analysis, should check the parameter whether varies with the different engine operating conditions. Usually when the engine is idle the parameter is about  $15^{\circ}$ ; when the engine is accelerating or running at a high speed, the parameter increases. If the parameters remain unchanged in different engine conditions, it indicates ECU fault. The timing light can also be used to detect the actual value of the engine spark advance angle, and comparing this value with the parameter, if actual spark advance angle and the parameter not match, indicating the installation location of crankshaft position sensor is incorrect, should check and adjust according to regulation.

#### ④ Starting Signal

This is a state parameter, the display content is YES and NO. This parameter reflects the location of the ignition switch detected by the ECU or whether connected when starter circuit starting. When the ignition switch turn to start position, starter circuit connected and operating, the parameters should be shown as YES, under other circumstances is NO. The engine ECU according to this signal to determine whether the engine is in start state, and thus to control the fuel injection when the engine start, idle and ignition timing. In numerical analysis, should check the parameters whether shown as YES when the engine starts. If the parameter is still displayed as NO when start, indicating the signal circuit fault from starting system to ECU, which causes failures such as difficulty in starting the engine.

#### ⑤ Ignition Control

This is a state parameter, the display content is YES or NO. The parameter represents that whether the engine ECU controls the ignition advance angle. Usually in the engine starting process, the ignition timing is controlled by the ignition electronic components, engine ECU without ignition advance angle control, then the parameter

is displayed as NO; after started and the engine ECU controls ignition timing, at this time the parameter display as YES. If the parameter display as NO during the operation of the engine, indicating some of the sensors in control system malfunction, the engine ECU can not control the ignition advance angle.

⑥ K n o c k

This is a state parameter, the display content is YES or NO. The parameter represents that whether ECU received Knock signal sent from Knock Sensor. When the parameter is displayed as YES, indicating ECU received knock signal; when displayed as NO, indicating that ECU did not receive knock signal. When conducting numerical analysis, can accelerate urgently in the operation of engine, then the parameter should be firstly displayed as YES, then NO. If the parameter is not displayed as YES when anxious acceleration or is also shown as YES when running at constant speed, indicating knock sensor or circuit failure.

⑦ K n o c k C o u n t

This is a numeric parameter, which ranges from 0 to 255. It represents the number of knock and related duration time calculated by ECU according to the knock sensor signal. Parameter values are not the actual number and time of knock, it is just a relative value that is proportional to the number and duration time of the knock. Any value greater than 0 indicate that knock has occurred. The value low indicates the times of knock is small or duration time short, high value indicates the times of knock is multiple or duration time long.

⑧ K n o c k D e l a y

This is a numeric parameter, which ranges from 0 to 99. It indicates the value that ECU delayed ignition advance angle after receiving the detonation signal sent by knock sensor, the unit is degrees (°). The parameter values do not represent the actual ignition advance angle value, merely indicating the delayed angle of ignition advance angle compared to the best spark advance angle in the current operating conditions.

⑨ E l e c t r i c a l L o a d S w i t c h

This is a state parameter, the display content is ON and OFF. The parameter represents load conditions of vehicle electrical system. When using headlights, brake lights, rear window defroster, air conditioning and other large electrical equipments, the parameter is displayed as ON; when all the attached electrical equipment turned off, the parameter is displayed as OFF. Engine control system uses this parameter when at idle speed to compensate for charging system (such as increasing the engine idle speed). To increase the alternator's generating capacity.

(7), Emission Control Parameters

Emission control parameters indicates the input and output signals among all sensors, actuators, and ECU of vehicle emission device that controlled by ECU, these emission devices including exhaust gas recirculation, air injection systems etc..

EGR command

This is a state parameter, the display content is ON or OFF. The parameter represents that whether ECU output control signals to let the exhaust gas recirculation control valve open. When this parameter displayed as ON, indicating that the ECU output control signals, exhaust gas recirculation control valve receives the signal and close circuit, open vacuum channel to let the vacuum into the exhaust gas recirculation valve, to have the exhaust gas recirculation device to start working. This parameter appears as OFF, the solenoid valve is not power on, cut off the vacuum of the exhaust gas recirculation valve. The parameters is displayed as OFF when the vehicle parking or the engine at idle, open-loop control state, usually shown as On when the vehicle is driving. This parameter simply reflects whether the ECU has output control signals, it does not indicate whether the EGR control solenoid valve receives the signal and is turned on.

#### EGR Temperature

This is a numeric parameter, which ranges from 0 to 5.12 (in V) or -50 to 320 (in °C). The parameter indicates that feedback signal transmitted from the exhaust gas recirculation temperature sensor installed on the EGR access to the ECU. The signal in the form of temperature changes indirectly reflects the flow of exhaust gas recirculation. When the exhaust gas recirculation flow is large, the exhaust temperature of the exhaust gas recirculation path increases, the value of this parameter increases; when exhaust gas recirculation flow is small or stop, the parameter value decreases. In the numerical analysis, you can compare the parameters with exhaust gas recirculation control commands. When the exhaust gas recirculation command parameter is ON, the exhaust gas recirculation temperature value should increase, otherwise it indicates that the exhaust gas recirculation device does not work or exhaust gas recirculation temperature sensor malfunction.

#### ④ Air Injection Commands

This is a state parameter, the display content is NORM or DIV. The parameter represents the commands sent out from engine ECU to air injection system. When the parameter is displayed as NORM, it indicates that ECU output control signals to the solenoid valve to have solenoid valve move the air injection valve, allowing air to spurt exhaust valve or exhaust manifold; when the parameter is DIV, indicating that ECU control valve move the valve gate, to spurt air towards atmosphere or three way catalytic reactor.

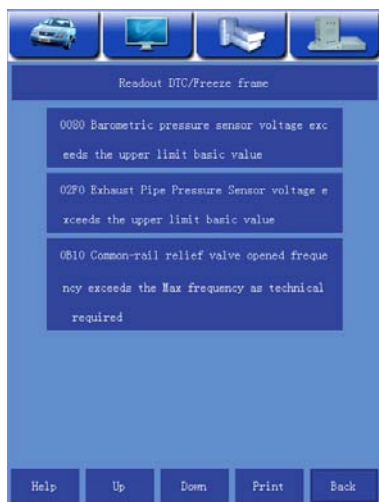


Figure 5.3.8A



Figure 5.3.8B



Figure 5.3.9A

### 5.3.10 Data Frame Freeze

When the trouble code related to Automobile engine exhaust emissions appears, OBD-II not only set one trouble code, as shown in 5.3.8A. But also can record the relevant system operating parameters while the trouble code appear. This group of data are called froze frame data:

If select "0080 atmospheric pressure sensor voltage above the upper limit threshold " fault code, enter into the next level menu. Menu display as shown 5.3.8B.

Respectively show the engine speed, throttle pedal ratio, intake pressure, common rail pressure, speed, water temperature, fuel injection quantity, intake air temperature, atmospheric pressure, oil temperature, load rate.

These data indicate the relevant data change detected by ECU when the fault code 0080 occurred, for the convenience of user to make analysis and comparison based on the current situation, understanding the root causes of system failure, and clear the malfunction rapidly.

Remarks: Not all system available for data freeze frame function.

When checking the system with this function, as each fault code generates the monitoring data stream items are not the same.

### 5.3.11 Action Test

Used to test whether the actuator elements and circuits of electronic control system are normal. The actuator projects are set according to the ECU, the current denso system executable components are as follows, as shown in Figure 5.3.9A.were: break cylinder test, target idle speed, engine exhaust brake solenoid valve, engine reducer1solenoid valve, engine reducer 2 valve, the engine shut down mandatory driver, PCV valve 1 mandatory stop,



Figure 5.3.9B

PCV valve 2 mandatory stop, inlet heater mandatory work, fuel leak inspection, turbine inspection.

Note: If the number of execution exceeds the screen display part, you can operate the progress bar the right side of menu or button **【down】** below the menu to select.

Take the **【Break cylinder test】** as an example to illustrate.

Select break cylinder test function into the next level menu, the menu shows conditions of break cylinder test, as shown in Figure 5.3.9B. As long as conditions satisfied, the break cylinder test can be conducted. If the conditions are not met, could lead to the failure of break cylinder test, or abnormality of the engine.

Confirm the current conditions meeting the test requirements, choose the button **【OK】** below menu to enter the next level menu.

**Note: the basic requirements of different testing elements are different, need to know the components' characteristics before test.**

The menu shows the current number of cylinders that can be conducted break cylinder test, as shown in Figure 4.3.4C, the current cylinders that can be broken is six cylinders. Based on the current engine operating conditions, click the cylinder number that need to stop to enter into breaking cylinder operating menu.

Take cylinder 1 as an example

Operating the **【start】** button on menu can perform the function of stop cylinder 1 working, after the implementation of stop cylinder 1 working, the engine will appear jitter or noise increase, indicating cylinder 1 was ceased to stop working or in the

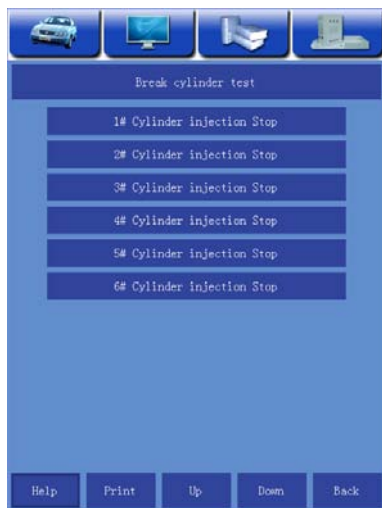


Figure 5.3.9C



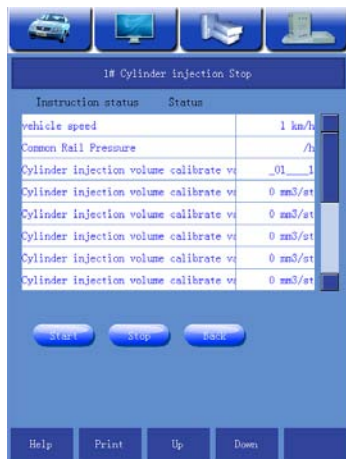


Figure 5.3.10A

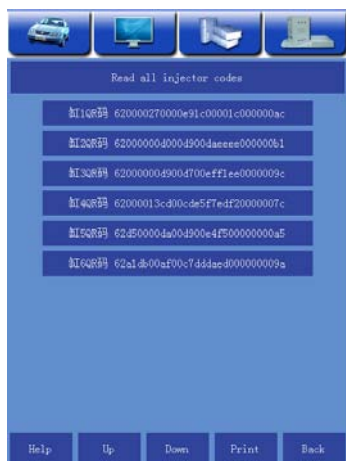


Figure 5.3.10B

menu bar can see obvious change of cylinder 1 data through the data stream. If cylinder 1 data and engine work did not change after operation, you can judge fault position according to vehicle breakdown.

Operating **【stop】** button on the menu can perform the recovery to work of cylinder 1. After return to work the data stream should be changed to the state before break, the engine work also recovered to the working state before breaking cylinder.

Operating the key **【Back】** on the menu can return to previous menu.

**NOTE: You must ensure the conditions of the functions performed are met, the injector circuit normal, if the conditions are not satisfied can result in failure of functional operation.**

### 5.3.12 Nozzle Data

In the menu of Figure 4.2.3, select **【Nozzle Data】** function, into the relevant operation of nozzle data, after entering the menu appears two operational functions as shown in Figure 5.3.10A:

- 1: Read all the nozzle code
- 2: write all the nozzle code

Select **【Read all the nozzle code】** you can read all the current injection nozzle code number stored in the ECU, as shown in Figure 5.3.10B .

Nozzle code is composed of numbers and letters, according to the different ECU types there were 16bit, 20bit, 28bit, 30bit, and 32bit. With the development of ECU control technology there will be more bits. Code is the only ID of injector nozzle, ECU Storage coding and the number of fuel injectors installed must be consistent, if error it can cause the engine to increase fuel consumption or engine abnormalities.



Figure 5.3.10C



Figure 5.3.10D

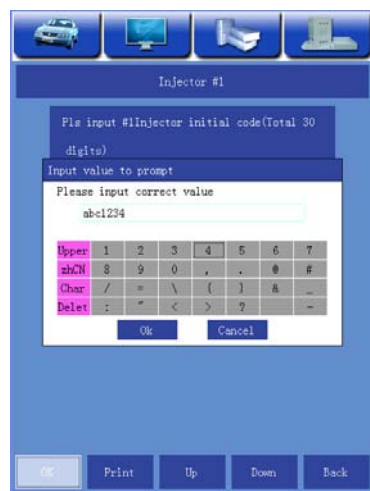


Figure 5.3.10E

In the menu of Figure 5.3.10A, select **【write nozzle data】** function into the injector nozzle code encoding menu, as shown in Figure 5.3.10C. Owing to injector nozzle code coding requires single-cylinder coding, in this menu select cylinders that needs coding to enter the code number write in menu.

This function is used when the new code written to ECU and the ECU injector nozzle code and nozzle code installed by vehicle does not match after replacing fuel injector nozzle.

Take cylinder 1 as an example:

Select **【the injector nozzle 1#】** into injector nozzle encoding, menu prompts basic precautions of encoding, as shown in Figure 5.3.10D. Confirm the code of cylinder 1 correct, operating button **【OK】** to enter the encoding menu.

Must obtain the correct code of nozzle before conducting injector nozzle coding, the wrong code can result in abnormal engine performance.

Input the correct code number on the code input menu, as shown in Figure 5.3.10E.

After finished inputting the correct code, click **【OK】** button to save the code in the ECU.



Figure 5.3.10F

If the current code is accepted by ECU, the menu will prompt **【success】**, as shown in Figure 5.3.10F.

If the current code is not accepted by ECU, the menu will prompt **【failure】**, then need to find the reasons for error, generally have the following possibilities:

- 1: code input error.
- 2: The new code error.
- 3: ECU does not support the new code.
- 4: ECU memory can not write data.

## 6. Registration, Activation, Upgrade and Download of Diagnostic Software

### 6.1 User Account Register, Activation and Upgrade



Figure 6.1A

**Login**

User Name :

Password :

 Login

[Register](#)      [Forget Password](#)

Figure 6.1B

**Register /**

User name :

product SN :

Password :

Confirm Password :

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HQ Address: 1614-1619, AnHui Building, ShenNan Road, Futian District, Shenzhen, China

Figure 6.1C

Note: take FCAR-F3+D edition for an example.

Other models is same with it.

Open website homepage <http://www.szfc.com>,  
English: <http://www.szfc.com/english/about.asp>, you  
can see FCAR English homepage as shown in  
Figure6.1A.

If you have registered for your product, you can login  
directly. See 【Figure 6.1B】.

If you haven't registered for your product to be our  
member. Pls urgently click Figure 6.1B 【Register】  
button, there is a new page to apply new user  
registration. See 【Figure 6.1C】. Then input relevant  
information and the correct FCAR Main Unit SN( the  
Sn is attached in the back of Main Unit or on the  
warranty card、Certificate of Approval), when you  
finish the input, pls click【Register】button as shown in  
Figure6.1C.



Figure 6.1D

If registered successfully, the Member Center will show your registered user name and password as shown in Figure 6.1D.

**Note:** The newly registered user name and password must be saved, as they are the only ID verification code to login Download Center to download the software.

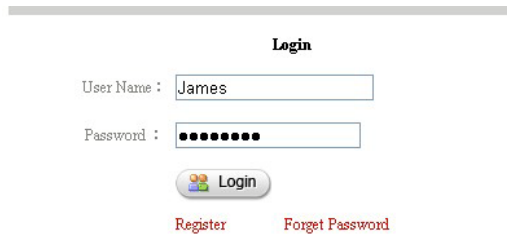


Figure 6.1E

Back to FCAR website to login directly with your user name and password as shown in Figure 6.1E

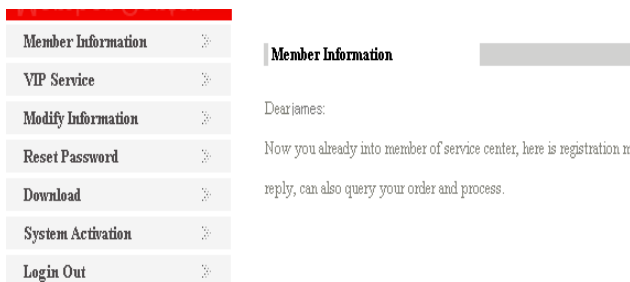


Figure 6.1F

Click **【Login】**, the page will show as **【Figure 6.1F】**

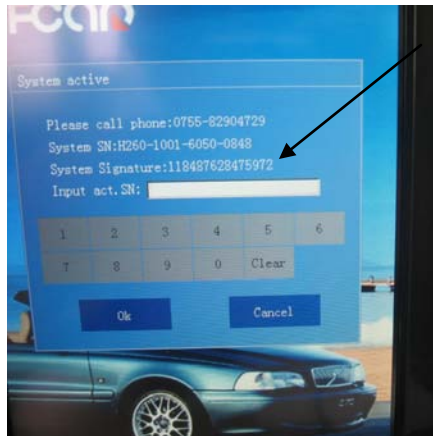


Figure 6.1G

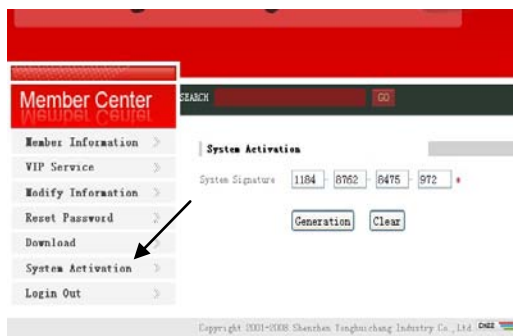


Figure 6.1H



Figure 6.1 I

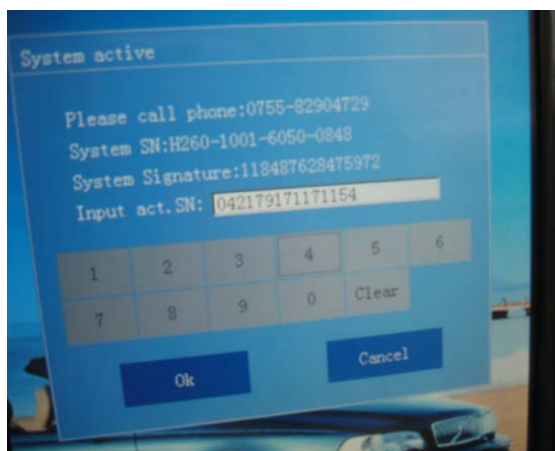


Figure 6.1 J

### ▲ System activation:

Normally when customer received the product, the screen will pop up “You have \*\* times use”. Customer need do the system activation to use without any times limitation.

**Method 1 – From FCAR Website to active by yourself.**

**Method 2 – Send to FCAR company to active by the email.**

Method 1 :

- 1) Turn On your Main UNIT. Open the system activation menu. You will see the system Signature as shown Figure 6.1G
- 2) Open the FCAR company website and login in the member. Click System Activation in the left side of page, and input the System Signature of Main Unit. As shown in Figure 6.1H
- 3) Click the button “ Generation” , the page will popup the ACT SN. As shown in Figure 6.1 I
- 4) INPut the ACT. SN in the Main Unit As shown in Figure 6.1 J
- 5) Then Click the button “OK” , will popup activation success as shown in Figure 6.1 K
- 6) After activation success, you can use again. If you don't need use the product, Pls Turn Off the Main Unit.

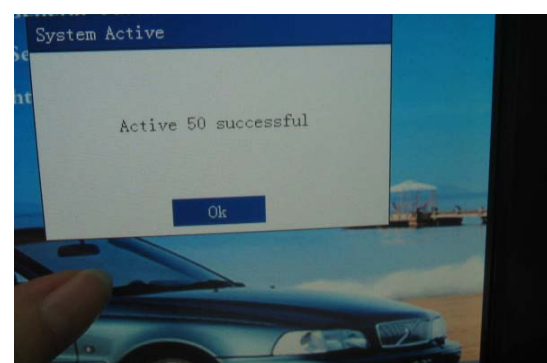


Figure 6.1 K

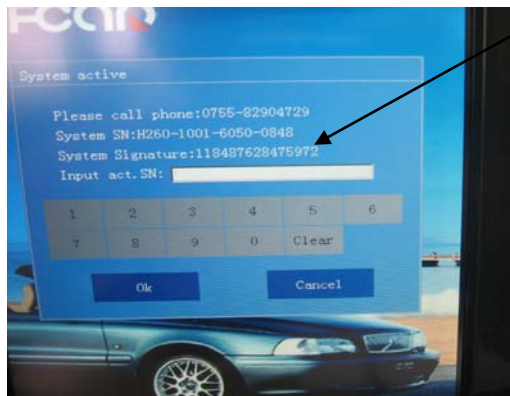


Figure 6.1 L

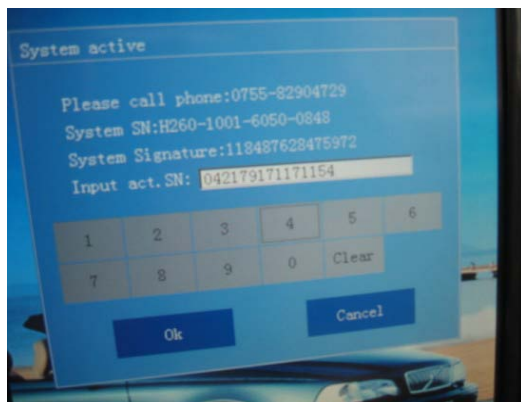


Figure 6.1 M

**Method 2 – Send to FCAR company to active by the email.**

- 1) Turn On your Main Unit , and Open the System Activation Menu. You will see the System signature (Figure 6.1 L) , Pls send this number to FCAR company by email/Call, Then FCAR people will answer to you the “ ACT. SN ” number, such as the ACT SN is : 042179171171154 , after you receiving the number, Pls input it in the Main Unit.( Figure 6.1 M).
- 2) Then click button “OK” to active. Will popup the activation success. Then Turn off the Main Unit if don't use!!

NOTE: All operations will be finished in one time. During the activation, if you turn off the Main unit, Main unit will get a new system signature in the Activation menu. you can input the new system signature in the website to generate a new ACT SN to reactive again. In addition, don't keep the Main Unit always on powering for long time.



## 6.2 Download of Diagnostic Software



Figure 6.2A

Click **【Download】** of the website. See **【Figure 6.2A】** FCAR Trouble Diagnostic program download have the **Full data package** and Individual Vehicle DataBase download, We advise select the full data package to download every time upgrade. of course, you also can select the other one and program version to download. See **【Figure 6.2B】** .



Figure 6.2B



Figure 6.2C

**Note:** the download method of Individual Vehicle DataBase is the same as that of Full data package. But we advise to down **full data package** together to avoid any problem in the process of upgrade every time. (ref our product introduction video)

Click **【Download】**, the page will be shown as 6.2C.



Figure 6.2D

Click **【Here】** download upgrade procedure. The download window will pop up and click **【Save】** as shown in Figure 6.2D.





Figure 6.2E

Select the disc you want to save, (remember the saved location) normally keep it on the desktop.  
Click **【Save】** button. See **【Figure 6.2E】**



Figure 6.2F

Click **【Close】** button when download finished, See **【Figure 6.2F】** .



Figure 6.3A

### 6.3 The Connection of SD Card

Take out the SD card from FCAR Main Unit. See **【Figure 6.3A】** .



Figure 6.3B

Take out the SD card reader/writer from FCAR Package Box (According to the real object) .  
See **【Figure 6.3B】**



Figure 6.3C

Insert SD card into the SD card reader/writer ( take note the direction ) as shown in Figure 6.3C.

**Note: The wrong direction can lead to SD card and reader damage.**



Figure 6.3D

Then insert the SD card reader/writer with SD card attached into USB port of PC. See 【Figure 6.3D】 .



Figure 6.3E

Select 【My computer】 in the desktop of Windows and dblclick. See 【Figure 6.3E】 .

After opening my computer it will show the removable disc, as shown in figure 6.3F.

#### Precaution on operation of the SD card

1) Don't pull out the SD card when the SD card reader/writer card is being used. 2) Don't Insert or Pull out SD card when FCAR Main Unit is turned on to avoid sd card damage or sd card data loss. 3) Don't format SD card frequently to avoid the damage of SD card data storage chip. 4) Don't put SD card in a strong magnetic field to avoid Sd card data loss. 5) Don't touch any mordant chemical product to avoid the damage of SD card metal pin.



Figure 6.3F

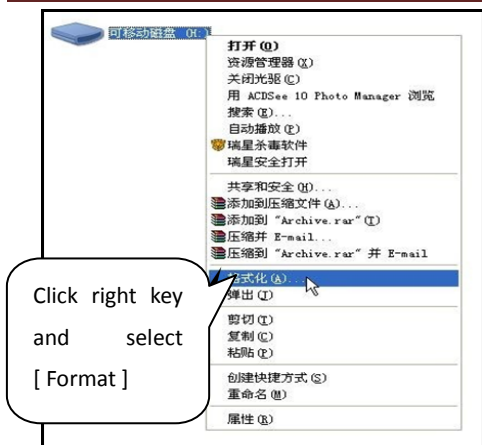


Figure 6.4A

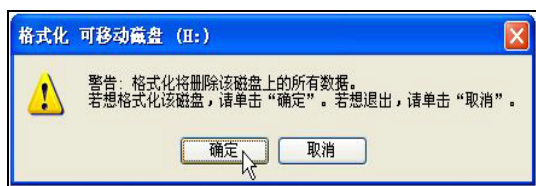


Figure 6.4B

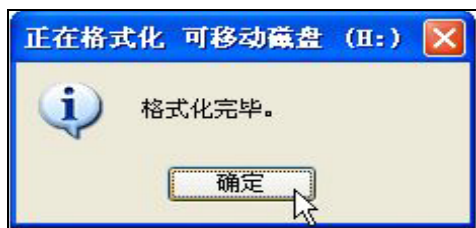


Figure 6.4C



Figure 6.4D



Figure 6.4D-1

## 6.4 Diagnostic Software Upgrade

Following the step of 【6.3 the connection of SD card】 and connect successfully, then select the removable disk of FCAR SD Card on My computer and click right key of mouse, select 【Format】, if your download interface haven't popped the hint of the format, it is available to upgrade directly without format. See 【Figure6.4A】

Select 【Start】, it will pop-up a warning window, Click 【Confirm】 to format SDCard. See 【Figure6.4B】.

After finished format, Click 【Confirm】 See 【Figure6.4C】.

Select the upgrade program just now you downloaded on the desktop, and dbclick it to open as shown in Figure6.4D.

NOTE: when you open the file, normally will pop up the message as shown in Figure 6.4D-1

Then you download the msxml.msi file firstly to open the address to download directly <http://www.szfc.com/download/msxml.msi> and install it.

After that, you can select the download file again to process the upgrade.

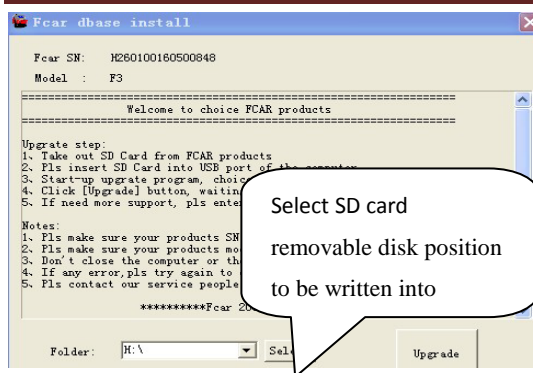


Figure6.4E

The FCAR F3-D product upgrade tool will be shown on the desktop. Click【Upgrade】,the program will be written into SD card, as shown in Figure 6.4E

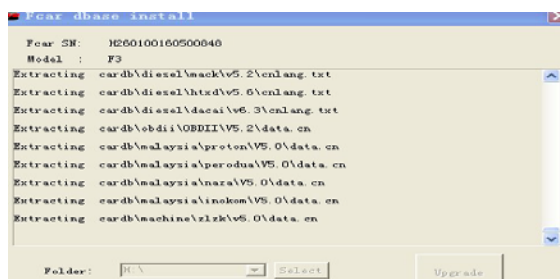


Figure 6.4F

It maybe take several minutes, Pls be patient. See 【Figure 6.4F】

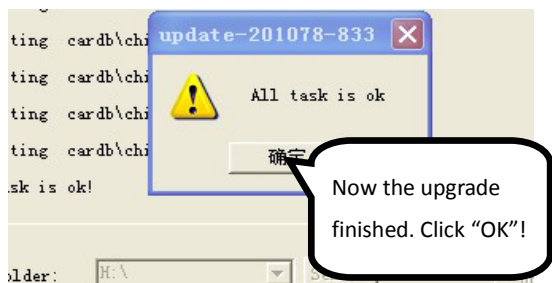


Figure 6.4G

Click 【Confirm】 to finish all upgrade steps. See 【Figure6.4G】 .

## 6.5 The Exit Step of SD Card



Figure 6.5A



Figure 6.5B

After software upgrade to the SD card successfully, you need to exit SD card from the computer, specific operation methods are as follows:

1. In the activity icon bar of the button right corner of computer screen, select removable hardware icon, as shown in Figure 6.5A.
2. Click the right key of the mouse, select the 【Safely Remove Hardware】 in the pop-up dialog box, as shown in Figure 6.5B.



Figure 6.5C



Figure 6.5D



Figure 6.5E



Figure 6.5F

3. In the pop-up dialog box, click **【Stop】** button to stop the computer attaching removable storage device (FCAR SD card), as shown in Figure 6.5C.

4. In the upper left side of the pop-up dialog box, select the USB device currently needed to stop, click on **【OK】**, as shown in Figure 6.5D, the computer system will conduct data separation on the USB device that need to stop.

5. After Computer finished data separation on removable devices (FCAR SD card), the computer display screen activity icon in the lower right corner bar will pop up **【Safely Remove Hardware】** dialog box. As shown in Figure 6.5E.

6. Unplug the Fcar reader that inserted with SD card from the computer USB interface, as shown in Figure 6.5F, to remove the SD card from the reader.

7. Insert upgraded SD card to Fcar F3-D main unit, the upgrade has finished.

**Note:** If don't follow this operation method, can cause loss of SD card data. When the upgraded SD installed to Fcar main unit, can cause system unable to work.

## 7. FAQ

### 7.1 Questions related to Main Unit Operation

#### 7.1.1 Power Can't be Turned On After Connecting Vehicle Diagnostic Socket?

Possible Cause: Check whether the diagnostic port has 12V power supply voltage; whether the connection between diagnostic main cable and connector of main unit is ok; check whether vehicle battery voltage is higher than 10V; whether main cable diagnostic connector has any damage or breakdown etc.

Solution: Check vehicle system voltage and main cable diagnostic connector.

#### 7.1.2 Screen Doesn't Display Except Backlight After Startup

Possible Cause: the power connection doesn't touch well

Solution: ShutDown and repeat Plugging/Unplugging the power supplier, StartUp again after 1 second.

#### 7.1.3 Screen Displayed Abnormally After StartUp

Possible Cause:SDCard isn't inserted well;SD card program damage;Supply voltage is too low

Solution: Take out SD card and insert again; Download SD card upgrade program:  
Checking the supply voltage

#### 7.1.4 Screen Displayed "SD Card Can't Be Detected" After StartUp

Possible Cause: SDCard is dirty with oil, or oxidation, also damage by upgrade incorrectly.

Solution: Wipe SD Card in a little alcohol with cotton tipped applicator; Change new SD Card

#### 6.1.5 Screen Flickers or Not Enough Bright After StartUp

Possible Cause: Vehicle power voltage is not stable or the voltage is too low, the supply is not enough for the main unit.

Solution: Check the Battery power and circuit.。

#### 7.1.6 Can't Input Data After Opening Soft Keyboard

Possible Cause: Touch screen is not accurate to adjust; the cursor location where is not editing.



Solution: Adjust the touch screen again; Use the touch pen to click the editing part, if the cursor is flickering, means it is editing

#### 7.1.7 Screen Doesn't Respond or Responds Wrongly When Touch Stylus Click

Possible Cause: The touch screen need adjust again (Note: you need adjust the screen after SD card upgrade every time)

Solution: the detail information Ref: "3.4 Screen Adjustment"

#### 7.1.8 The Tested Result Can't be Printed Out or Printed Unclearly

Possible Cause: Lack of the print paper; Mounting paper incorrectly or reversely;

Solution: Update the heat sensitive paper and take out the paper and mount it again.

#### 7.1.9 Unable To Enter The Failure Diagnosis Program

Possible Cause: SD Card internal program failure; SD Damage

Solution: Upgrade SD Card diagnostic program again; Change SD Card

#### 6.1.10 Displayed "Authorization Doc.Error, Pls Contact Dealer" When Diagnose

Possible Cause: The SN in SD Card and Main Unit are not matched

Solution: Download the relevant main unit diagnostic program, and make sure the correct software upgrade following the operation instruction.

## 7.2 Questions Related to Vehicle Diagnosis

#### 7.2.1 Split Second Screen Flickers During Engine Starting

Possible Cause: Effected by electromagnetism, or the battery voltage fluctuate is large when

Startup vehicles.

Solution: it is the normal phenomena (just try to avoid power on when start the engine)

#### 7.2.2 Operation Interrupted During Diagnosis

Possible Cause: Effected by electromagnetism, or the connector to the socket is not tight

Solution: Depart from engine compartment with strong electromagnetism environment, turn off the high-power acoustics, check main unit connector..

#### 7.2.3 There Is No Response From Vehicle ECU at Communication

Possible Cause: Supply power voltage is out of the normal range; the Throttle Valve is not

closed, Transmission is in “D”; Turn on by electrical appliances, Water temperature is out of the normal range

Solution: Inspect the supply power voltage, close the throttle valve; put the transmission in “P”; Turn off the electrical appliances, make sure the water temperature is in normal range.

#### 7.2.4 Some Systems Can't Be Diagnosed

Possible Cause: Few system diagnostic sockets in the forepart vehicles are separated.

Solution: Pls Ref. the vehicle user manual.

#### 7.2.5 No Trouble Code is Found

Possible Cause: Usually for the third part trouble code of common circuit.

Solution: Search the most similar trouble code and the circuit to analysis.

### **7.3 Questions Related to Website Login, Doc. Upgrade, Download**

#### 7.3.1 Can't Open FCAR Website

Possible Cause: System maintenance; Internet connection problem, IE browser fault or firewall reject etc..

Solution: try to open after several hours; Change the internet, restore computer system, close the firewall.

#### 7.3.2 User Account Can't Logon

Possible Cause: User name or password is wrong; local internet problem; IE browser fault

Solution: Call FCAR to get back password; change other internet; restore computer system.

#### 7.3.3 Diagnostic Program Can't Be Downloaded Successfully

Possible Cause: System IE browser fault; download software don't support; Virus Fault.

Solution: Restore computer system, install or download others software

#### 7.3.4 FCAR Website Is Slowly When Open and Logon

Possible Cause: System IE browser fault; download software don't support; Virus Fault.

Solution: Change others internet; restore computer system.

#### 7.3.5 “Individually Vehicle DataBase” Update Whether Need Format SD Card

It is no need to format SD Card. Just check upgrade software whether is right.



7.3.6 Screen Popupd “Separation/Extracting Module Failed” While Opening Update Program, Update Unsuccessfully.

Possible Cause: you cut off the operation in the process of main unit upgrade, then it will popup the hint when upgrade again.

Solution: Restart the computer.

7.3.7 Screen Indicated “ Please Install msxml 4.0 SP2 program ” While Upgrading SD Card

Possible Cause: the first time to run the upgrade program.

Solution: You can download from the internet “msxml 4.0 SP2 program” and install in your computer , then upgrade.

7.3.8 Screen Displayed “Can’t Find Application Program, Error Code 0 !”

Possible Cause: there is no program in SD Card

Solution: Download the program to upgrade



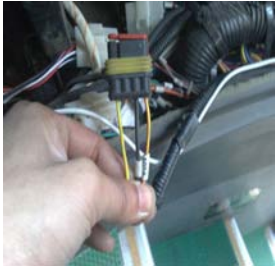

#### **7.4 How to Select Diagnostic System of Domestic Vehicles**






Solution: As there are various models and brands in china, engine electronic control systems can be domestic independently developed, or from joint ventures, import. Because the difference of the brands and the technology capabilities of each vehicle manufacturers, domestic car engine management system electronic control system is divided into BOSCH, DELPHI electronic control system, MARELI electronic control system, SIMENS electronic control system, MOTOROLA, Witt, Nanyue etc. The wrong choice of the system will cause auto fault diagnostic computer unable to communicate with the control unit, false fault, inaccurate fault code inaccurate data stream, misplaced data stream display, etc. problem. Diagnosing the vehicle assembled with such electronic control system should pay attention to the following questions:



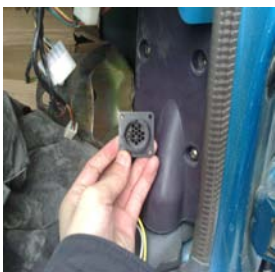


- 1) Vehicle model match with auto fault diagnostic software.
- 2) The control unit type match with diagnostic software.
- 3) The control unit model match with diagnostic software.
- 4) Diagnostic seat match with fault diagnostic connector.


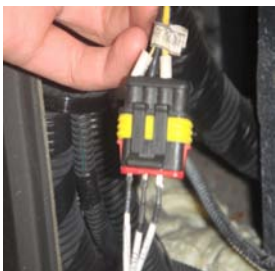


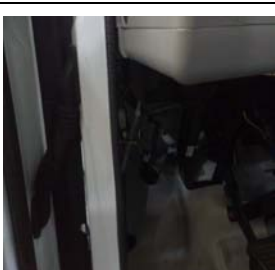
Note: when diagnose the vehicle models that not for sure about the above conditions, only by entering into the system successively and observing the accuracy of data streams to judge whether choosed the right electronic control system, or pull out the corresponding sensor actuator, checking whether the fault code of the vehicle fault decoder is associated with the the components pulled out, to judge whether the system is the right choice.






## 8. Diagnostic Socket Position Introduction of Common Model





Model	Engine	ECU	Diagram	Diagnostic socket position
Heavy Duty Truck HOWO	Hino	DENSO		On the left of instrument for 2008 year models, can insert directly. Old models usually close to fuse of the driver position.
ZhongTong bus	Xichai	BOSCH		On the right side of central control board, near the wipermotor, single row 4PIN diagnostic socket
ZhongTong bus	Yuchai	BOSCH		On the right side of central control board, near the wiper motor, single row 4PIN diagnostic socket
Medium Kinglong bus	Yuchai	BOSCH		On the right side of central control board, near the Fuse Carriers, standard OBD-II diagnostic connector.

Large Kinglong Bus	Yuchai	DELPHI		In the right side of central control board, near the wiper motor and close to front door, single row 4PIN diagnostic socket
Large Kinglong Bus	Cummins	BOSCH		In the lower left side of central relay rack, round 16PIN diagnostic connector.
Higer	Yuchai	BOSCH		Below the instrument, round 16PIN diagnostic connector.
Kinglong Minibus	Yuchai	BOSCH		Right above the right door pedal, round 16PIN diagnostic connector.
YuTong medium-sized Bus	Xichai	BOSCH		In the lower left side of Central relay rack, round 16PIN diagnostic connector.

Large Kinglong Bus	Yuchai	BOSCH		In the lower left side of Central relay rack , round 16PIN diagnostic connector
Hino automobile	Hino engine	Denso		On the top left of brake pedal , standard OBD-II diagnostic connector
FAW Jiefang	Xichai	BOSCH commom rail		On the column A in the right side door, round 16PIN diagnostic connector.
Jiefang	Dachai	monoblock pump		Below the steering wheel, round 16PIN diagnostic connector.
Jiefang	Dachai engine	monoblock pump		Below the column A in the left side right door, round 16PIN diagnostic connector.

FOTON Bus	Yuchai &Shangcha i&Weichai	BOSCH& Denso		Below the central console box and near the ECU, standard OBD-II diagnostic connector.
	Yuchai	BOSCHco mmon rail		4pin black waterproof connector near the fuse carriers
Shanxi Automobile	Weichai engine	BOSCHco mmon rail		On the right side of instrument, on the fuse carriers, standard OBD-II diagnostic connector
Ssangyong Benz	Benz engine	BOSCH		Near the column A, round 14PIN diagnostic connector.
Isuzu Automobile	Isuzu engine	BOSCH& Denso		On the bottom left of instrument and near the column A, standard OBD-II diagnostic connector

	Isuzu engine	Denso		On the bottom left of instrument and near the column A , double row 20PIN diagnostic connector
Liuzhou	Weichai	BOSCH		Below the driver seat, standard BOD-II diagnostic connector
Liute Automobile	Yuchai	Domestic Unit Pump System		On the right side of instrument and near the right column A , 3PIN diagnostic connector
Liuzhou Motor	Heavy duty truck	EGR		On the right side of instrument and near the fuse carriers. Standard BOD-II diagnostic connector
Dongfeng Automobile	Renault	BOSCH		On the relay rack of the instrument right side, near the right column A, round 16PIN diagnostic connector.

Volvo Automobile	Volvo	monoblock pump		On the bottom left side of instrument , above the clutch pedal , double row 8PIN diagnostic connector
Mitsubishi	Mitsubishi	BOSCH		Under the center console, on the fuse carriers, standard BOD-II connector.
Dongfeng Duolika	Zhaochai Engine	BOSCH		On the bottom left side of instrument, beside the A column, round 16PIN diagnostic connector
ABS	ABS	Webco		Beside the ABS computer controller, domestic vehicles adopt round 16PIN diagnostic connector

**Note :**

Each vehicle manufacturers have the option of additional pins for the diagnosis of a variety of different systems. Can not guarantee that each manufacturer comply with the same standard in all respects. Therefore Pin distribution will be different from what talked about here. Pin distribution specified by the manufacturer please decide according to specific models and maintenance information.



## 9. Warrant Clause

### Warrant clause

Dear Fcar users, welcome to choose Fcar F3-D products. In order to better use of the product, we recommend that you should maintain your product well, and operate in accordance with user manual's instructions in each use. If your use to meet this requirement, your product will be able to provide you longer-term services.

- 1、 In line with the following terms and conditions. And under the premise that you have bought Product and register in the website of Shenzhen FCAR Technology Co., Ltd. (hereinafter referred to as "FCAR Technology"), if there are defect in materials or workmanship of hardware, Fcar technology will provide free product warranty services by our distributor.
- 2、 Confirm that you have carefully read the product warrant clause, otherwise as Fcar Technology registered your mailed warranty card stub , you will be considered as agreeing to and accepting the terms of this warrant clause.
- 3、 Your product must be purchased from product dealer that authorized by FCAR Technology. To purchase products through the non-normal channels, buyers have to take the cost of product maintenance services and so on and can't warranty by FCAR Technology.
- 4、 The following items of products: items that are easy to wear and tear such as product instructions, inner and outer package box, attached power supply, promotional giveaways, SD card, card reader, touch pen, printing supplies etc. are not under warranty range
- 5、 Products from the date of purchase (with valid purchase proof and effective warranty card of the product), if the products occurred the non-human damaged performance failure, you can choose repair or replace the product of the same model within a month. You can enjoy one year warranty service of Main unit connector, test cable, power adapter which is non-human damaged and incorrect operation.
- 6、 Products in any of the following case, will not be able to enjoy free warranty service:
  - 1) Failure, defect or flaw that not belong to the quality of Fcar Technology products : including your use of the product not according to the product instruction, improper operation of the product, crash, fall, disassembly by yourself, connection of improper accessories, damage owing to crash because of improper transport or storage of the product, the erosion and corrosion, etc. that caused by infiltration of liquid or food.



- 
- 2) the natural wear and tear of product: including but not limited to cover, keypad, LCD touch screens, accessories etc..
  - 3) Product main unit serial number and warranty card product serial number does not match, product quality inspection tag or bar code removed, altered or damaged.
  - 4) Maintenance and modification without the approval of Fcar Technology or FCAR distributor
- 7、The product quality problem or failure occurred within the warranty period, you can take the following measures:
- 1) You can inspect product by yourself based on products help information. If there are no hardware quality problems, try to upgrade the product program.
  - 2) You can dial FCAR Technology local distributor to obtain the correct service information.
- 8、In the process of product warranty, you can contact with local Fcar Technology designated distributor and responsible to delivery or ship to the location.
- 9、Enjoying your free warranty service under this warrant clause is the only measure for the losses due to product defect within the product warranty period. Fcar technology shall not be liable for your direct or indirect loss.
- 10、All product warranty information, product features and specification changes will be posted on Fcar Technology latest promotional materials and Web site without further notice.

Shenzhen Fcar Technology Co., Ltd. After-sales Service Department

Postcode: 518111

Service hotline: 0755—82904729

Fax: 0755—89687605

Website: [www.szfcar.com](http://www.szfcar.com)

## Appendix: The Definition and Discription of Diagnostic Socket

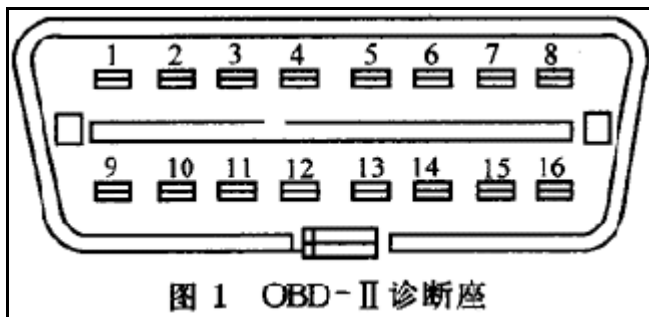
### OBD-II Introduction

OBD- II is short for ON-BOARD DIAGNOSTICS- II. The diagnosis system before 1993 is the first generation of diagnostic systems. The manufacturers adopts different diagnostic sockets, fault codes, diagnostic functions, which caused difficulties for repair personnel. American Society of Automotive Engineers (SAE) developed a set of standard specifications which approved by the "Environmental Protection Agency" (EPA) and the "California Resources Association" (CARB), and require automobile manufacturers provide a unified standard diagnostic mode, socket in accordance with OBD- II standard. Thus a single instrument can diagnose and detect all kinds of vehicles.

OBD- II is the standard specified by California. All vehicles sold to California, whether from Europe, American or Japan are required to meet the standard. Currently China mainland and Taiwan also adopt the standard. Owing to adopting this standard, the trouble of using instrument for technicians have been simplified. So having an in-depth understanding of the characteristics of OBD- II is essential. According to the development of automobile communication, most models in the present word adopt OBD standard.

### OBD-II Characteristic

- (1) Unified 16Pin Diagnostic socket in OBD-II vehicles models, as shown in Figure 1



- (2) Value analysis data transmission function( DATA LINK CONNECTOR short for DLC);
- (3) Unified Fault Code and its explanation in OBD-II vehicles models;
- (4) With the driving recorder function;

(5) With the function of redisplaying memory fault code;

(6) With the equipment function of clearing the fault code directly;

### 三: DLC (data transmission connector) Diagnostic Socket Unified Standard

(1) DLC diagnostic socket for 16PIN and is located in the cab, under the instrument at the driver side

(2) DLC PIN data transmission line have two standards:

Φ ISO=Europe Standard.(INTERNATION STANDARDS ORGANIZATION 1941-2)  
make use of 7#,15# pin

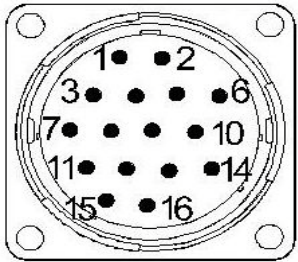
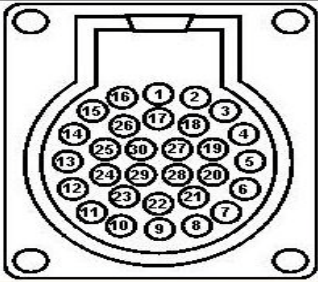
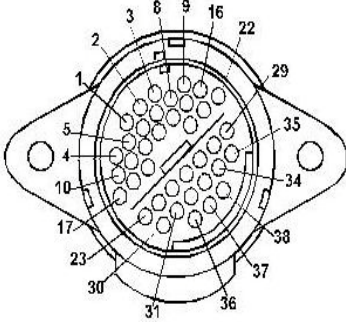
∅ SAE==United States Standard (SAE-J1850) make use of 2#,10# pin

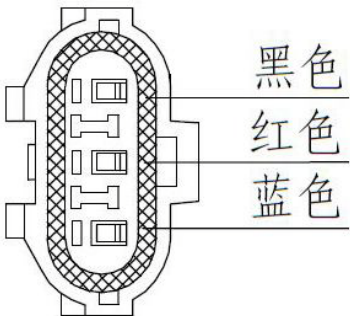
The function of all terminals of OBD- II diagnostic socket, see Table 1.

Table 1 The function of all OBD- II diagnostic socket terminals

Terminals	Function description	Terminals	Function description
1	SAE J2411, GM single wire CAN;GM.single line CAN-BUS	9	Pin7 is inconvenient to use, use *KWP1281 or KWP2000 protocol diagnostic cable (K line)
2	ISO11519-4 (Bus+)(SAE J1850), used with Pin 10	10	ISO 11519-4 (Bus-)(SAE J1850
3	CCD-BUS internet cable H line	11	CCD-BUSinternet cable L line
4	Body directly grounding	12	K line manufacturer for preservation
5	Signal circuit grounding	13	K line manufacturer for preservation
6	ISO 15765-4;CAN-BUS high-speed diagnostic cable (H line)	14	ISO15765-4;CAN-BUS high-speed diagnostic cable (L line)
7	KWP1281orKWP2000protocal diagnostic cable(K line)	15	KWP1281or KWP2000protocal diagnostic cable(K line)
8	IG+;ignition switch ON/OFF	16	Connect to positive battery “+”

### Diagnostic Socket Discription

Name	Picture	Terminal discription
<b>Round 16PIN diagnostic socket</b>		1#: anode (12V/24V) 2#: cathode 5#/8#: ISO K diagnosis 15: anode 16: cathod
<b>Round 30PIN diagnosti socket</b>		11 #: Connection terminal 15 21 #: CAN High level 22 #: CAN Low level 27 #: Connection terminal 30 28 #: Speed 29 #: Speed signal 30 #: Grounding
<b>Iveco 38PIN Diagnostc socket</b>		1#: EDC/EGR L line 2#: EDC/EGR K line 3#: ABS;ABS/ABD L line 4#: ABS;ABS/ABD K line 5#: SRS/Retarder L line 6#: SRS/Retarder K line 7#: Combined instrument L line 8#: Combined instrument / Speed odometer K line 9#: Auxiliary /complement heater L line 10#: Auxiliary / complement heater K line 11#: Connection terminal 15 12#: Start acceleration protection K line 13#: HVAC L line 14#: HVAC K line

		<p>21#: CAN BUS high level</p> <p>22#: CAN BUS low level</p> <p>27#:Connection terminal 30 (anode)</p> <p>28#: speed</p> <p>29#: speed signal</p> <p>30#: Grounding (cathode)</p>
<p>Yuchai Unit Pump Diagnostic Socket</p>	 <p>黑色</p> <p>红色</p> <p>蓝色</p>	<p>Black: Grounding (Cathode)</p> <p>Red: Diagnosis L line</p> <p>Blue: Diagnosis K line</p>



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